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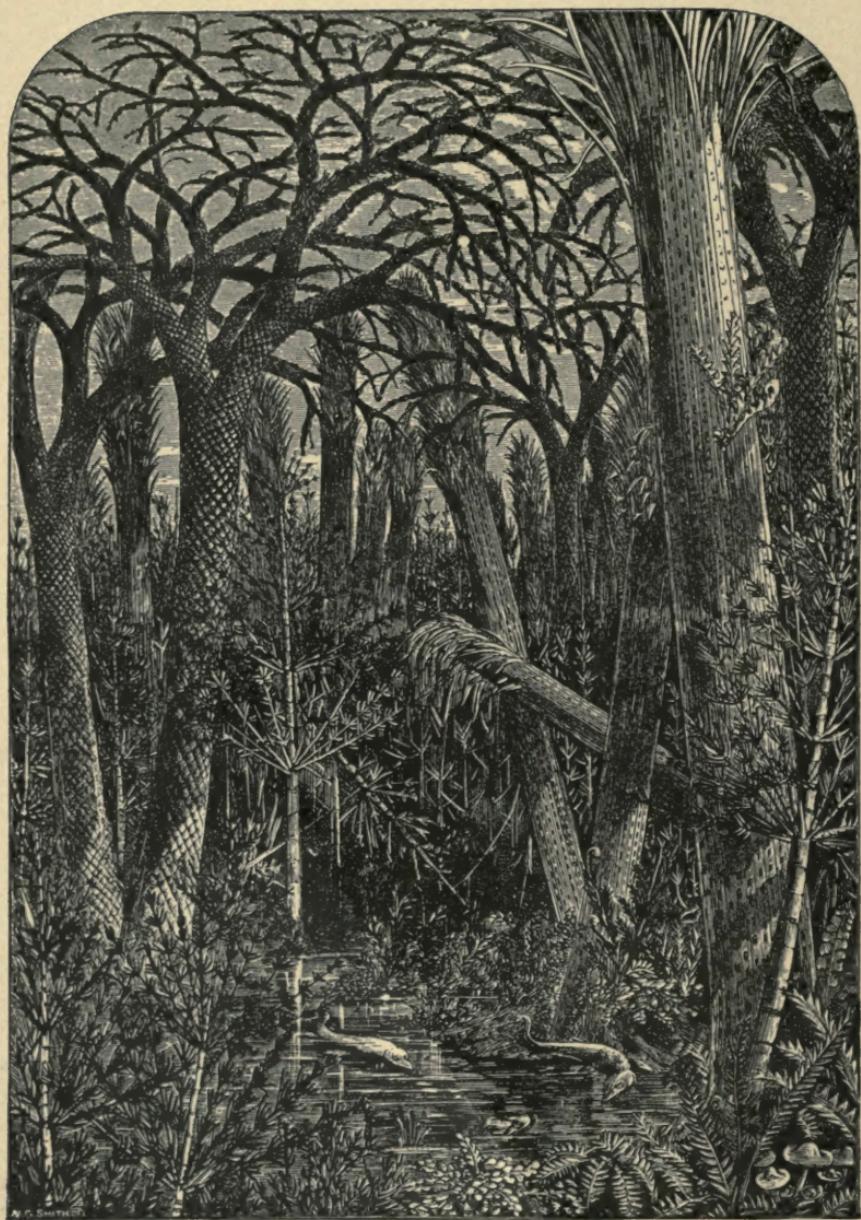


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IDEAL LANDSCAPE OF THE COAL-MEASURE PERIOD.

To Mr. Edwin Atlee Barber, A.M., Ph.D., etc.,
with the author's kind regards. 20/8/95.

REVIEW

23158

OF

"MODERN SCIENCE AND MODERN THOUGHT,"

Etc.

IN A SERIES OF LETTERS TO A LADY.

INCLUDING DISCOURSES AND STORIES RELATING TO
GENERAL MODERN SCIENCE AND MODERN
THOUGHT, AND SUPPLEMENTED
WITH "CLOUD HILL."

BY

WILLIAM HENRY GOSS, F.G.S., F.R. Met. Soc., Etc.

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PREFATORY NOTE.

THESE letters are printed at the express desire of the lady to whom they were written, and at the instance of numerous other distinguished persons, her friends, among whom the original manuscripts were passed, serially, and read.

CONTENTS.

	PAGE
LETTER I.—Examination of the Nebular Theory.—A Terrible Dream.— Germs and Spores of the Air Misunderstood.—Germ-hatched Beneficent Workers in God's Art of Government—or Nature—seen at their Work	3
LETTER II.—The Natural History of the Blow-Fly and Common Fly, from Observation.—Carbolic Acid.—The Genie and the Doctors and Nurses. —The Impudence of the Fly	6
LETTER III.—Statistics of Air-germs.—Trichinosis.—Death the Gate of Life. —The general Beauty, Joy, and Health of the Pilgrimage of Life.—The Inquisitiveness and Jollity of the Fly.—Window-pane Enchantment	11
LETTER IV.—Theory of the Nebulous Origin of Worlds further Examined.— Granite.—Heat.—The Diamond.—Gases.—Water.—Ice.—Wedding and Divorce of Matter	14
LETTER V.—On the Limited Variation of the Earth's Solar Heat.—Its Ex- haustibility.—Professor Crooke's Ray-mill.—The Ray-force of the Sun. —The Comet and the Sun.—Measurements of the Sun's Distance.— Products of Combustion.—The Mystery of Light and Heat.—Luminous	

	PAGE
Paint.—Flint and Steel.—Oxidation of Iron.—Latent Light.—Cosmic Electricity.—The Patience of God	18
LETTER VI. —The Light of Comets and of the Sun.—Nebulæ again.—Meteors, or the Materials of Planets.—Their Combustion in our Atmosphere.—Heat and Light of Gaseity.—The Law of Gravity.—Sub-oxidation of Early Ferruginous Rocks.—Examination of falsely-called Igneous Rocks.—Miracle-working Basalt.—On “The Cosmos and the Logos.”—More about Flies, and Germs in the Air	25
LETTER VII. —The Sun a Mortal Satrap.—Baal and Apollo Deposed.—The Sun’s Agency of Beneficence.—Man’s Lordship of the Earth.—Man’s Final Replenishment of the Earth.—Evidences of Almighty Love Throughout.—Light and Heat a Mysterious Divine Essence.—The King, his City, and his Sepulchre.—Eternal Life and Joy.—“A Street in a City.”	33
LETTER VIII. —Electricity, Heat, and Light.—Description of the Sun.—Meteorology.—Phaeton and his Disaster.—Crag and Tail.—Drift.—The Origin of these Letters.—Cosmic Electricity.—De Saussure’s Atmospheric Electrometer.—Centrifugal Force Examined ...	40
LETTER IX. —Divine Patience in Opposition to Divine Desire of Human Praise.—The Lord of the Sun ; and Sun-worship.—Age of the Inhabited Earth.—Origin of Coal.—A Philosopher’s Appraisement of the Whole Planetary System...	46
LETTER X. —“Discovery of the Petrified Ruins of an Ancient Forest.”—The Sigillariae.—Tremendous Upheavals and Depressions of the Earth’s Past.—Snowdon and Cader Idris.—The Carboniferous Landscape.—The Lepidodendra, Calamites, Tree-ferns, and Cycads.—The Carboniferous Atmosphere.—The Stigmaria.—Coal and Clay Seams... ...	53
LETTER XI. —The Passage of the Sun’s Rays into Distant Space.—Meteorology again.—Passage of the Stars’ Rays through Space to the Earth.—A Great Carboniferous Lake.—Fishes and Mussels suddenly Buried in Mud.—Oceanic Erosion and Formation of Permian and Triassic.—Wonderful Providence in the Natural Formation of Coal, Ironstone, and Fire-clay.—The Process Revealed in these Ruins of an Ancient Forest	62
LETTER XII. —Faith Clinging to Error.—The Formation of Chalk.—Origin of Flints.—Examination of Chalk at Gravesend.—Origin of Mountain Limestone and its Seams of Chert.—Early Siliceous Streams ...	76
LETTER XIII. —The Undiverted Passage of Radiance through Radiance.—The Priests of Baal and their Sacred Fire.—Infinite Diffusion of Light	

and Heat.—The Wisdom of Knowledge to know that we Know Little.— Man's constant Irrecoverable Loss of the Metals.— The evident Finality of all existing Conditions of Terrestrial Things.—Life a mere Progress of Blessing.—Mysterious Dreams of Knowledge.—Dr. Huggins at Cardiff.—The Nebular Theory again.—Some of the Elements of Stars and Planets Examined to shew Results of Condensation from Glowing Vapour.—The Spectroscope Abused.— Dark Suns.—The Goal of Stellar Progress.—A Crowd of Night Visitors	86
LETTER XIV. —Theory of the Earth's Internal Heat Examined.—Science is Knowledge of Truth and Correction of Error.—A Globe eight feet in Diameter enclosing Intense Heat with a Cool Exterior one eighth of an inch thick.—Astronomical Contradictions.—More about Dark Suns.— The Career of a Shooting Star.—The Heavenly Wedding of Oxygen and Iron.—Night Visitors again.—The Marvellous Mechanism of Insect Life	97
LETTER XV. —Why the Temperature Increases in the Descent of a Pit.— Similar Increase in the Descent of a Mountain.—The Earth's Absorption and Radiation of Heat.—Increase in Descending a Pit not Uniform.— The Origin of Volcanic Fires.—Silurian Coal.—The Remarkable Furnace	106
LETTER XVI. —A Wonderful Modern Moon-and-Tide Theory.—The Agencies of Rivers and Tides in forming Strata.—The Calm of the Lower Silurian Period.—Inconsistencies in Accepted Theories.— A Period of Calm Crystallization preceded the Great Granitic Disturbance.—The Formation of Protoxide of Iron.—Mathematics dealing with Error as Basis.—The Mystery of Light and Heat	III
LETTER XVII. —Contradictory Modern Theories of the Sun.—The Mystery of Light and Heat again.—Cause of the Blueness of the Sky.—The Wave Theory of Light.—The Breath of a sleeping Infant.—Theory of 4,072,000,000,000 Eye Fibrilæ Vibrations per Second.—Light Unenlightened.—The Solar Spectrum.—Crimson.—Observations noted with a Prism in Hand.—The Sunset.—All Colour a Divine and Eternal Manifestation	119
LETTER XVIII. —The great Eruption of Krakatoa in 1883, and the Sun-gloves of 1883, 1884, and 1885.—The Report of the Royal Society on the same	128
LETTER XIX. —Gold and the Primary Colours of Light.—Erroneous Conclusions on "Conservation of Energy."—The Energy of the Combustion of Coal Explained.— The wonderful Affinities between Oxygen and Carbon.—The Dissolution of Silica by Lead and Oxygen.—An Eloement from the Crucible.—"Conservation of Energy" is in and from	

the Sun.—Falsely called Silicates of Potass and Alumina.—Immediate Consequences of the Sun Extinguished.—On Cosmic Annihilation ...	142
LETTER XX.—Theism : Pantheism : and Agnosticism.—A Trinity of Truth.—“Hell : Where is it ?” by Saladin.—A False Saladin.—Hideous Blasphemy and a noble Peroration.—Atheism and the Priesthood.—The Religion of Liberty, Love, Equality, and utter Unselfishness.—The true Herakles of Humanity.—Come Gentle Death !—The French Revolution.—The General Christian Bond of Divine Charity.—Catholics, Anglicans and Quakers ...	152
LETTER XXI.—The Divinity of Charity.—Theism : Pantheism : and Agnosticism : or, God : God Everywhere : therefore God Infinite and Incomprehensible. — The Mind in Animals. — Saladin and Burns. — The Mystery of Evil.—The Wolves in Sheep’s Clothing.—The Revolution.—This Transitory Life.—The Divine Mystery of Healing.—Mr. Laing’s Beautiful and Humble Agnosticism ...	166
LETTER XXII.—The Theory of Electric Friction Examined.—The whole Material Universe compared to a Clock.—Different Phases of Agnosticism.—The Divine Clock and the Divine Clock-Maker and Keeper.—Prayer all a Mistake.—Sleeping Brahm.—Waking Brahm.—The Hindu Trinity.—Southport.—Spiders and their Ways ...	176
LETTER XXIII.—The Metamorphosis of Princess Arachne, the Mother of Spiders.—The wonderful Skill of Spiders.—The Mason.—The Hunter.—The Diver.—The Raft-BUILDER. — The Sapper and Miner.—The terrible Tarantula.—The Aeronaut and his Heredity.- What is Instinct ?—The Fascination of the Tarantula.—The Spider’s Anaesthetic.—Carnivorousness a Divine Institution.—King Solomon as Botanist and Zoologist.—Aristotle.—The Tetrix or Cicada.—Origin of Pantheism.—The Carpenter Bee.—Baal-zebub ...	182
LETTER XXIV.—“Spiders, Pantheism, and Emperors.”—Saladin and Three in One.—The Pantheism of Ancient Field-Naturalists.—Man’s impotent Dependence in Nature, although Lord of the Creation.—The Lord of Flies, of Plants, and of the Sun.—The Caterpillar and the Ichneumon.—Pantheism by itself no Theism.—Emperors.—Mars, Minerva, and Britannia.—The Mexican Jumping Bean ...	193
LETTER XXV.—The constant Strife in Terrestrial Animated Nature.—Life a Stage of Passage from some other State to some other State.—The Battles of Doves and Lambs.—The pre-Adamite Warfare.—The Purbeck Geologic Forest-ground in Dorset.—Its terrible Fauna.—Man’s Suc-	

	PAGE
cession to the Lordship with the Command to Subdue.—His wondrous Conquest.—A group of Zulu Warriors.—The constant Human Strife.—Story of the Conversation between the Spider and the Fly	205
LETTER XXVI. —Hamlet : “What a piece of Work is a Man !”—Woman.—Little Helen Keller from wicked Texas.—God-like-ness again.—The Dog’s limit of Mind.—The Divine Potentialities of a half-created Girl.—The happy Dog and the wretched Donkey and Horse.—Charles Dickens and the Village Dogs.—Dog and Man Kinship.—Deaf Dumb and Blind Helen Keller writes a Fairy Tale.—Helen’s Ideas.—Dickens and the Blind Deaf Mute of Lausanne.—Helen’s dream...	218
LETTER XXVII. —More on the Nebular Theory.—The many Mansions of the Father’s House.—Apology for Sunworship.—The Fiery Palace of Asmodeus.—Breathing and Drinking Fire.—The Combustion of Potassium and its Evidence.—The Meteors and their Evidence.—Recapitulation of Evidence against the Nebular Theory	232
LETTER XXVIII. —The Mystery of Life.—The Theory of Spontaneous Generation.—Protoplasmic Cells.—“I spect I grow’d.”—Universal Law and Energy.—Design in the Creation Denied.—Self-creative and Self-adaptive Fish Bones.—The Foot of Ajax	241
LETTER XXIX. —The Agnostic Denial of Design in the Creation.—Bacteria and the World of Parasites.—The Serpent, the Slug, and the Centipede.—Beneficent Design in both Joys and Punishments.—Evidences of Divine Design in all Nature.—The Orange Pip, the Butterfly and its Blossoms, the Camel, the Tortoise, the Humming-bird, and the Bird-of-Paradise.—The command to Man to Subdue the Earth	248
LETTER XXX. —Design in the Creation ; continued.—The Voice of the Infant.—The Baloon and its Inflation.—Man’s Yearning for Wings which never come.—Involution precedes Evolution.—Embryo Man in a Fish.—The Clock of Life.—Pigeons.—The Sculptures of the Assyrians and Greeks.—The Struggle for Life.—Ten little Pigs.—Further Evidences of Design in Creation.—Design in Mother’s Love.—The Agnostic Deposition of God, and Deification of His Clock in His Stead	255
LETTER XXXI. —Arguments on Design in the Creation continued.—The Fish-fin and the Human fin.—Law of Life and Lord of Life.—Story of a Genie of the Fire from Epsilon in Orion.—His Views of the Earth, the Earthites, and their Works, in his three Messages from Earth to his Home-star	263
LETTER XXXII. —The Infinite and the Finite.—Faith crystallized into Knowledge.—Antiquity of Man.—Some Palæolithic Implements not	

fashioned by Man.—Natural Fractures of Quartzites, Flints, Chert, and Volcanic Rocks.—Flint Jack.—Palæolithic Flints found in their Mother-beds.—Nile Valley Deposits ...	272
LETTER XXXIII. —More on the Law of Evolution.—On the Adaptation of the Eye to the Habitat of Life.—On Dogs, with a beautiful Sketch of them by Mr. Laing.—Thomas Cooper the Poet and Chartist.—On Languages and their Changes.—The Capacities of the Negro.—The Future of the American Negro ...	283
LETTER XXXIV. —Religion.—The Man-form Gods.—The Birth and early Life of Buddha.—His Divine Sympathy with suffering Mankind.—His great Renunciation of the World and its Kingship that he might Save Mankind.—Buddha Remarkably like Christ.—Sir Edwin Arnold and “The Light of Asia.”—Buddha’s Farewell to his Wife Yasodhara ...	293
LETTER XXXV. —Buddha’s Retirement and Self-denial.—He Refuses the Offer of His Father’s Kingdom.—He Declares that he is Searching for Joys that Endure.—No Annihilation in true Buddhism.—Buddha’s Intense Compassion.—The Four Sublime Truths of Buddhism.—Its final Redemption and Nirvana or Heaven ...	301
LETTER XXXVI. —The Sacred Bodhi-tree.—Buddha Tempted by Mara the Prince of Darkness.—He commences Preaching.—His rapid Success.—He sends forth Sixty Apostles.—Resemblance between the Buddhist and Christian Epochs.—Kisagotami and her dead Child.—Purna the Buddhist Apostle.—The last Hours and Words of Buddha.—His Religion of Universal Love.—The Brahman and Magian Religions of worldly Gain.—Xenophon’s “Cyropaedia.” ...	309
LETTER XXXVII. —Buddha’s Heaven-on-Earth, and final Heaven.—His “Karma” and Christ’s “Born anew.”—The Theism and Prayerfulness of Buddhism.—Brahmans and Brahmanism.—Buddha further Compared with Christ.—The “Ascension” of each.—Ultimate Absorption? or Eternal Individuality?—By the waters of the Dee at Llangollen.—Individuality means Love, Absorption all Self.—Negro Redemption ...	317
LETTER XXXVIII. —Seeking Hell with a Telescope.—“Natural Sentences and Punishments—Automatous.”—The Uncharitable Millionaire: His Sentence.—The Cruel Master of Men, Women, Children, and Horses: His severe Sentence.—The Perverse Selfish Woman and False Wife: Her terrible Sentence.—The Wretched Lame Life-long Beggar.—The Overworked Beaten Horse.—The Ever-beaten Donkey on the Sea-beach.—The Punishment of Tantalization.—Both Hell and Heaven upon Earth.—The final Redemption and Restoration ...	326

LETTER XXXIX.—Mrs. Jameson.—The Soul's Expansions.—The Sphinx and Man.—The Soul's Embodiment in Star-matter.—Little Dogs and their Manners.—“ Perfect Through Suffering.”	... ... ... ... ...	334
LETTER XL.—Cyrus on Labour and Task-masters.—Soul Development and Star-matter Development.—The Mystery of Life.—The golden Sands of Rhyl.—The empty Houses of the Sea.—Its Armies of fierce Warriors.—A Rook’s Feather.—Divine Design Evident.—The wonderful Tubicolous Annelids, and their Crystal Houses on the Beach.—The effective Arms and Armour of the Shrimp and Prawn.—Prince Kropotkin on Nebulæ, and the Earth’s Axis.—The North Pole once Torrid	... ... ... ...	342
LETTER XLI.—The Testimony of the Rocks.—“ Behind the Veil.”—The Progressive Life of Death.—Divine Economy of Life from the Beginning.—Constant Terrestrial Preparation for Progressive Life.—The complex necessary Elements of Man’s Cornfield and Garden.—Tennyson on Fruitless Prayer.—The Earth a mere Stage of Progressive Life.—Benevolent Design Evident in Creation.—Little Children Citizens of the Kingdom of Heaven.—Good and Evil.—Agnosticism and Atheism.—Positivism.—Miracles.—Entomological Visitors again.—Only Saved by Adversity.—Modern Progress in Crime	... ... ... ...	352
LETTER XLII.—What is Agnosticism?—The Agnostic Author of “ Modern Science and Modern Thought” is a True Christian.—St. Paul on Christian Charity.—Miracles.—Christianity Itself a Miracle.—Belief and Disbelief.—Napoleon the Great on his Death-bed.—Parables.—Early Prophecies Fulfilled.—Redemption.—The Law of Nature is Progress and not Happiness.—The Pilgrim’s Progress and the Rake’s Progress.—The Land of Beulah	... ... ... ...	366
LETTER XLIII—The Land of Beulah, or Nirvana on Earth.—The Mystery of Trials.—Christiana and her Progress.—Mercy’s Dream.—Father Honest.—The Invincible Christian.—The Conqueror of Death.—Mr. Fearing.—Mr. Feeble-mind.—The Comforts of the Pilgrimage.—The Sons and Daughters of God.—The Son of God.—Christian-pagan Rites.—Aven Rosch the Arabian.—Use not Vain Repetitions as the Heathen do.—The Lord’s Morning Prayer.—The Schoolboy and the Apple	... ...	375
LETTER XLIV.—The Smitten Cheek and taking no Thought for To-morrow.—International Lions and Lambs, Eagles and Doves.—The Essential Spirit of Christianity.—The Kinship of Dogs and Men.—Paddy.—Buddha Consulted.—The Career and Influence of Buddha Divine and Miraculous.—The Miraculous when Possible not Supernatural.—The Supernatural Impossible within Nature.—The Water changed to Wine.—The Sons of God in Genesis	... ... ... ...	384

LETTER XLV.—The God of Abraham.—The God of Job, of the Psalms, and of the Prophets.—The God of the Grecians.—The Olympian Jove and his Wife.—The Crimes and Punishment of David.—Mr. Laing's Noble Exposition of Christianity.—The Great "Unknown" in which Everything is Possible.—David's Penitence.—Mr. Laing's Patriotic, Chivalrous, and Christian "Practical Life."—"Fear Nothing; make the Best of Every- thing."	395
LETTER XLVI.—Definition of Nature.—Mr. Laing's Review of "Dawn of Creation and of Worship."—Digressions.—The Bible a Divine Evolution.— Human Errors in the Bible.—On the Right Side with Wrong Weapons: on the Wrong Side with no Weapons.—Involution and Evo- lution.—"Give me Light."—"Proem to Genesis."—More Palæoliths. —Divine Inspiration.—Eternal Punishments.—A Model Rector and Bishop	404
LETTER XLVII.—Drummond's "Natural Law in the Spiritual World."— Nature Includes All, and Nothing in Nature can be Supernatural.— Biogenesis.—The Protoplasm of Life and of Death.—Failure of all Attempts to Manufacture the Protoplasm of Life.—Farewell!	413
LETTER XLVIII.—More Diarial Notes on the Progress of Larvæ and Pupæ to Flies and Blow-flies.—The Bad Passions of a Maggot.—The won- derful Metamorphosis within the Pupa-case.—The Resurrection to a Life of Joy and Blessing	417
LETTER XLIX.—Nothing is Created in Vain.—On the Carnivora again.— God's Provision of Food.—Rules of Development of Fly-Larva, Pupa, and Imago Confirmed.—The Perfect Enginery of the Untaught Fly.— A Curious Nocturnal Visitor	424
LETTER L.—The Dancing Bean of Mexico.—Different Accounts of it.—The Difference between Instinctive Impulse and Deliberative Genius ...	429
LETTER LI.—Instinctive Affinities.—"Uncle Philip's Conversations with Children."—The Leaf-rolling Larvæ and Moths.—The Judgment and Genius of the Larva; and mere Instinctive Impulses of the Moth, or Mother	437
LETTER LII.—More American Accounts of the Dancing Bean.—The Mystery of its Life.—R. Gordon Cumming on African Animals who Drink no Water—the Oryx and Eland.—The great Californian Tortoise.— Observations on the Dancing Bean ...	444
LETTER LIII.—Partial and Imperfect Views of Nature.—Paddy's Experience in a Railway Carriage.—Magic.—The Egyptian Magi.—The Destruction	

of the Roman Empire.—The Modern Gothic Magi and their Clairvoyant Scenes and other Works of Magic.—“The Daily Telegraph.”—Wonders not Wondered at	454
LETTER LIV. —A Persian Tale, being “The History of King Ruzvanschad and of the Princess Cheheristany.”	467
LETTER LV. —The Bee and the Box	483
LETTER LVI. —More Observations on the Dancing Bean.—Diomedes and Glaucus.—Spring, Electricity, and Carbonic Acid Gas.—The Nerves.—The East Wind.—Leaves.—“Primitive Man and his Work.”—Conclusion	487

CLOUD HILL.

INTRODUCTION. —Report of an Excursion of the North Staffordshire Naturalists' Field Club and Archaeological Society to Cloud Hill, near Congleton. Reprinted from “The Staffordshire Advertiser” of 28 May, 1881	499
PART THE FIRST. —As Mount Pisgah	504
The Origin of Millstone Grit, of Clay, and of Ironstone...	509
Some Observations on the Geology of the Cheshire Plain	519
On the Deposition of the Flora of the Carboniferous Period in the Coal-measures	533
Conclusion	547
PART THE SECOND. —The Temperature of the Carboniferous Period	551
The Chemistry of the Air of the Carboniferous Period	555
Coal Basins or Troughs	561
Marine and other Coal Seams	565
Let the Rocks alone bear Witness.—The Testimony of the Rocks	568
The Stigmarian Root of the Sigillaria	572
FINAL NOTE	585

REVIEW OF “MODERN SCIENCE & MODERN THOUGHT,” Etc.

LETTER I.

EXAMINATION OF THE NEBULAR THEORY.—A TERRIBLE DREAM.—
GERMS AND SPORES OF THE AIR MISUNDERSTOOD.—GERM-HATCHED BENEFICENT WORKERS IN GOD'S ART OF GOVERNMENT—OR NATURE—SEEN AT THEIR WORK.

10 MAY, 1891.



Y DEAR MRS. ANDERSON,—I have only just now been able to look at Mr. S. Laing's “Modern Science and Modern Thought” and read as far as page 12. I note in the preface for future comment the words “Prevalence of law throughout the universe to the exclusion of supernatural interference.” And the next thought for immediate comment is on page 11 referring to the nebulous patches discovered by means of the telescope in distant space as “enormous masses of glowing gas, or cosmic matter, out of which other universes are in process of formation.”

This is the orthodox belief of astronomers and Mr. Laing is not responsible for it. But I have to deal with the *book* whose-soever ideas it may proclaim. This theory of the nebulous or gaseous origin of worlds will not bear examination. All gases are compounds of heat and something which without the heat must collapse into a solid. The solid simple metals and other bases of matter, such as the diamond, must have had existence before they could become gaseous compounds, and must have been the earlier elements of “universes.”

In other words, the original condition of all matter is solidity ; and gaseity and fluidity are not original conditions from which world-matter results. Heat cannot be self-supplied or self-maintained in a mere nebulous mass so as to keep up nebulosity or gaseity. The chemical action which supplies heat must soon cease when all the atoms of a mass are simultaneously subjected to it, from simultaneous exhaustion and instant diffusion of the heat in space. If the heat of the sun were to cease to act upon the materials of the earth, the earth's gaseousness and liquidity would be changed in a *few hours* to general solidity. If the activity of the sun's combustion were to become so accelerated that the whole of the sun's solid mass should become suddenly nebulous and gaseous, it would be the climax of its heat-giving power, imparting gaseousness to the whole solar system : and it would then be the *end* of its heat-giving power, resulting in the immediate collapse of all the matter of its system into cold, solid, dark desolation. Instead of the nebulous state being the state "out of which other universes are in process of formation" it must be the immediate precursor of their death ; for the heat would depart from every atom with the fleetness of the passage of light, into infinite space, leaving, as I have said, all its material in a state of cold, solid, dark, desolation. Whenever I use the word "nebulous" here I use it only in the sense of my text "glowing gas."

I once had a tremendous dream which nearly killed me in its occurrence. I thought the universe was a sort of gunpowder—all of it—and it was my inexorable destiny to fire and explode the whole, and render all life, and all things into nebulosity. It was to be done by means of a rocket shot upwards, which on its return to the ground should cause the explosion of worlds. I sent up the rocket. I could not help it. And while it was ascending and descending I was enduring the agony of responsibility for the fate of worlds. I awoke just before the hissing rocket had re-touched the earth, and the result was a complete prostration for several days. The matter of worlds subjected to this nebulizing heat would be like the gunpowder explosion I was expecting in my agony—a brief state, only, of ignition ; not lasting like those star-clouds that the telescope reveals.

Proceeding from the vast to the very minute, Mr. Ling replaces the telescope with the microscope and says on page 12—for which he is not personally responsible—"The air also is shown to be full of

innumerable germs and spores floating in it, and ready to be deposited and spring into life, wherever they find a seed-bed fitted to receive them. Given a favourable soil in the human frame, and the invisible seeds of scarlet fever, cholera, and small-pox ripen into full crops, just as the germs of a fungus invade the potato crops of a whole district, and lead to Irish famines and the extermination of more than a million of human beings."

I think I have before hinted to you that I cannot accept this view of the destiny of the life-germs which are ever present in the air all round the globe, and the supply of which is kept up by the natural daily addition of millions of millions to the store. For although it may be only in the autumn that the flies eject from their expiring bodies each its germ-cloud, the autumn, as well as the other seasons, lasts all the year round, marching with daily steps round the globe in the sun's course. So the supply is never interrupted for one day, and the winds carry it everywhere. Now it seems to me impious to suppose that this wonderful normal arrangement of the creation, evidently the design and work of the Almighty Artificer, the same who reveals Himself to man so practically as Love itself, should fill all the air with germs or "invisible seeds of scarlet-fever, cholera, and small-pox," all crowding about seeking opportunity to injure mankind, to say nothing of all our other fellow tenants of the earth. If it were so, disease must become normal. These germs are perfectly normal as I have said, and incessant, while the diseases are abnormal. From whatever abnornal causes the diseases may arise, I regard this universal provision of germs, which encompass all creatures, and are breathed by all creatures, whose normal state is health, as the normal enemies of disease, and beneficent protectors from disease. I believe that their "favourable soil in the human frame," or the "seed-bed fitted to receive them," is the locality of the already incipient or developed disease, and that they spring into hungry life just where they are needed, and that their destiny is to feed upon the material of the disorder and arrest its progress. But all these germs are not created even to arrest incipient diseases, or cure them directly in the bodies of animals only. Their great duty is also to preserve health, and prevent disease, in preserving the healthiness of the atmosphere by eating that which would impair its healthiness. Now you may yourself witness the actual exhibition of their feeding upon deleterious-

ness, and so preserving the purity of the atmosphere, by the use of a microscope of very moderate power. Nature's provision is that dead organic matter shall not, when left on the surface of the earth, be allowed to resolve itself direct into its component gases ; as that would render the air unwholesome for the living. Therefore the numerous carnivora are nature's scavengers, and these life-germs of the air become the same. In each case the dead matter is eaten, and lives again in the fresh organism into which it is absorbed ; the gradual waste of which is less hurtful ; instead of all at once crowding the air with its offensive gases of dissolution. Your microscope will shew you exactly how the hatched air-germ works its appointed part in this item of God's Art of Government, or Nature. When the water in the glass on your table is perfectly pure, he is not wanted, and does not strip off his coat to work. But place cut flowers in that glass of water on a warm day, and in a few hours you will have provided work for a whole gang of these labourers—profitable work too. Put under the lens a spot of the water in which there is a speck of the decaying pith of the flower-stalk, and you will see the labourers hard at work turning the death into life—ravenously tearing up and devouring the decaying matter, that it shall not poison the air of your room with an excess of carbonic acid gas. They are working and seizing their wages at the same time and growing rapidly bigger as they change the death to life in their own bodies. How different that to the mission ascribed to them of germinators of scarlet fever, cholera, and small-pox ! They develop differently in different media and in accordance with the work that media will afford them, by the wonderful contrivance of the Art of God. I will give you another instance of the operation of this Art, in a similar manner, but by another means. But I will do so, if I do not already weary you, in another letter, for there is still much to be said on this subject confirmatory of my view.

LETTER II.

THE NATURAL HISTORY OF THE BLOW-FLY AND COMMON FLY, FROM
OBSERVATION.—CARBOLIC ACID.—THE GENIE AND THE DOCTORS
AND NURSES.—THE IMPUDENCE OF THE FLY.

15 MAY 1891.



ERHAPS the most remarkable of nature's scavengers are the various tribes of the omnivorous and omnipresent common fly, the parent of the aerial life-germ which we have under consideration; and the further instance which I promised to give, of nature's mode of getting rid of dead organic matter without waiting for putrefaction, is the history of the infancy of the same wonderful creature. The mission of the common blow-fly is to find out any dead animal matter which may have escaped the larger carnivora, or be in holes or places inaccessible to the latter. I watched the exercise of the "Art" in 1888 and made the following notes at the time. It was our Potteries holiday-time, and I was stopping at my Cheshire home; hence the leisure. Some people will smile contemptuously at the idea of watching the results of the operations of a blow-fly. But they are those who are more than very ignorant of the wonderful world in which they move; and blind to the divinity of common things; and content to remain in that ignorance and blindness:

" Rode Heath, Cheshire, 7th Aug., 1888. 11 a.m.

" Found eggs deposited by blow-fly on a plate containing raw beef, and put the plate aside for observation. The eggs were near, but not upon the raw beef.

" 8th, 11 a.m. Most of the eggs hatched. Larvæ very minute. Later on when all were hatched, and had attached themselves to the beef, I placed it in a bowl.

" 9th, 11 a.m. Larvæ grown about fifty-fold since yesterday morning. Must have been eating without cessation, night and day.

" 10th, 11 a.m. Larvæ still eating actively, and seem to have increased in size a hundred-fold. Added a piece of roasted fat.

" 11th, 11 a.m. Increase of size not so rapid as before. Original piece of flesh probably insufficient for them. Fat untouched. Added a fresh piece of raw lean, which they attacked ravenously, and are feeding as actively as ever. In a few minutes every one of the larvæ has forsaken the dried up remains of the original piece of flesh, and is ravenously busy at the new scrap. It is clear that their growth has been retarded for want of food.

" 12th, 11 a.m. As ravenous as ever, and much increased in size. I have given them another small scrap of raw beef; all there is in the

house and rather dry ; and a piece of lean of roast beef.

" 13th, 11 a.m. They don't seem to be eating at all. It may be that the food is too dry ; or they may be fully grown, and seeking places in which to undergo metamorphosis.

" I took them from Rode Heath to Stoke, and there gave them fresh meat. At first they did not seem to want to eat, but wandered about as if in search of hiding-places. Afterwards they took to ravenous feeding again. Query : If they had had no more food would they have become the pupæ of ordinary flies ? and will they by the extra feeding become the pupæ of blow-flies ?

" 14th, 11 a.m. Still feeding. I have separated and placed without food four of the larvæ and await result.

" 15th, 11 a.m. Still feeding ; except the four who have nothing to feed on.

" 16th. To-day they are all restless again as on the 13th. Probably wandering about to seek holes, &c., for pupa state. Not much increased in size since 14th.

" 17th, 11 a.m. They are all still very active, wandering in every direction ; evidently seeking earth or crevices. There are two in the pupa state ; one of them in a dark brown case, the whole exterior resembling the form of the outstretched larva with its pointed head ; the other being a dumpty elongated oval, of a brighter brown or red.

" Ditto, 5 p.m. I placed some sand in the box, which has replaced the bowl, and they have all been bathing in it. Still very active.

" 7 p.m. They are all lying about, under and upon the sand, perfectly motionless as if asleep. They evidently felt the want of something to burrow into.

" 18th, 11 a.m. Although the layer of sand is very shallow, every one of the larvæ is interred in it, and completely out of sight. They evidently had a strong natural desire for self-interment.

" 3 p.m. All quiet, but not yet changed.

" 19th, Sunday. Not observed ; I being away at Rode Heath, and the larvæ at Stoke.

" 20th, 9-30 a.m. Found all changed to pupa state. Nothing to note until—

" Sept. 4th, 11 a.m. Found one fly just emerged from its case, lying on its back, playing with its case by rolling it about in all

manner of ways upon its stomach with its feet ; like one playing on a bed with a bolster ; but with wonderful skill, like a clever juggler. At intervals it ceased this play to rub its fore legs together, and to rub its head with them, as flies often do ; but all the time remaining on its back.

" 11-30 a.m. It has just thrown aside the case and sprung upon its legs, distended to about four times the size of its case. Walks about its wire meat-safe prison while its wings expand visibly. This being out first is probably the one first changed to pupa state on Aug. 17th.

" 11-45 a.m. Wings fully formed and expanded. It is distended into a full size blow-fly, but is short of sheen or colour.

" 2 p.m. It seems to be a perfected fly with blue sheen.

" Sept. 5th, 7 a.m. Another found on its back playing with its case as before described.

" 7-40 a.m. Fully developed.

" Sept. 6th. Coming out all day and all seem alike. Several more did the juggling business, like an acrobat playing with a large ball with his feet."

Of these pupæ three never hatched, and one only produced the common house-fly. All the rest were blow-flies. The three which never hatched, and the one producing the common house-fly were the result of the four short-fed larvæ. Had they not all been started feeding again on the 13th there is no doubt the whole would have turned out common house-flies. As to the four, there was an irregularity in starting them feeding afresh after they had stopped at a certain stage, then suddenly depriving them of food again, and that may have caused the fatality to three of them. But the fact that one came forth a common fly, is sufficient to shew that we have been wrongly instructed about flies and blow-flies. The wondrously rapid growth of the larvæ was Nature's wondrously beneficent method of changing dead flesh into healthful life, instead of leaving it to pollute the air with offensive gases ; just as the animalculæ in the water, hatched from the air-germs, feed upon dead vegetable matter. So doubtless do their cousins do beneficent duty in the human frame eating up the germs of diseases which arise from abnormal conditions of life, and not from these normal blessings in the air.

Suppose the amputation of a limb. The danger is subsequent

corruption of the wound and mortification. In the ordinary course of nature, these air-germs would do duty in that wound, scavenging it until healing took place. That is nature's mode. But man has discovered the application of carbolic acid ; which prevents the corruption, and at the same time destroys the air-germs whose services it renders unnecessary. Strangely enough, man's mode appears superior to nature's ; yet nature provides the carbolic acid. But for nature to *apply* it, as man does, would be quite unnatural, and *miraculous*.

To blame the air-germ for all the mischief which goes on where he happens to have fixed himself and become active, is too bad. He has no more to do with the origin of the mischief than have the larvæ of the blow-fly to do with the death of the ox whose decaying flesh they help to prevent from poisoning the air. It is as though some unknowing but well-meaning Genie, passing among men, and pitying their physical grievances, came to the conclusion that their sufferings were all caused by the doctors and the nurses, because he generally found them present where the sufferings were ; and so set about poisoning off all the doctors and nurses that all diseases might cease.

To return to the flies ; people so cling to their ignorance in regarding them as mere plagues, and the blow-fly especially as an unmitigated evil. The family of the latter, which I reared, as just described, had their resurrection from the pupa tomb under a wire-gauze dome-shaped meat-safe ; a thing to keep them in, which was especially made to keep them out. And I remember that when my watching was over, and I was carrying the large dish and its dome cover out of doors to liberate the prisoners, I was expostulated with as about to commit a great wrong in letting loose into the world that great group of abominable pests to work so much mischief. I think there were about seventy of them. How many seventies of thousands they produced that autumn I know not. But certainly they became the grandmothers of seventies of thousands of millions of millions of air life-germs. If these be evils at all, then was I the author, or abettor, of immense evil. But I know it is otherwise ; and that I am *not* responsible for the Influenza.

No wonder that the common fly, so important an agent in God's Art of Government, carries himself with so little respect for all other things and persons ; claiming admission everywhere ; and the right to

examine and taste everything ; and enforcing his rights and claims with sublime courage ; while the ignorant regard him merely as a stiff sturdy prying tasting thief ; caring for nothing and for nobody ; examining with equally bold inquisitiveness the nose of a king and the ear of a pig.

I am now leaving home for a few days, after which I will proceed to read from page 12 of "Modern Science and Modern Thought" and make further report.

[P.S.—Later on I again experimented with the eggs of the blow-fly, and fully confirmed the conclusions arrived at in this letter ; as will be seen at the close of this series].

LETTER III.

STATISTICS OF AIR-GERMS.—TRICHINOSIS.—DEATH THE GATE OF LIFE.

—THE GENERAL BEAUTY, JOY, AND HEALTH OF THE PILGRIMAGE

OF LIFE.—THE INQUISITIVENESS AND JOLLITY OF THE FLY.—

WINDOW-PANE ENCHANTMENT.

25 MAY 1891.



TURNING from Southport I find your two most welcome favours for which I thank you. I have not yet found time to look again into the book, but the newspaper cutting which you enclose to me, respecting the deaths from Trichinosis suggests further remarks on the germ question which we have been considering. While I have endeavoured to shew how inconsistent with God's beneficent Government of the world is the theory that the natural and normal life-germs of the air are the ever-present disease and death "seeds of scarlet-fever, cholera, and small-pox ;" I am not denying the existence of life's evils, physical as well as moral. But I find these diseases to be abnormal and not a natural and necessary part of life ; while the universality of the air-germs, which are breathed by those who are healthful from childhood to old age, proves that *they are* natural and normal. Where the germs are most needed for purposes of purification, they most abound. They are little needed on the tops of high mountains, and have been found there at the rate of one in the space of a cubic metre of air ; while in hospitals, where the sick generally recover health day by day, these little doctors—whose pardon I beg for having previously called them

little scavengers—are found to the extent of about seventy-nine thousand in the same space, besides those actually at work helping the healing of the sick ; over against about forty thousand in healthy but populous parts of cities. Yet these figures have never been quoted to support the views which I hold, but the opposite. These germs abound also in air which we know to be balmy and healthful, in our parks and rural lanes, and that ought to convince us that they are not sent by beneficent Providence as agents of evil to mankind. But, still, evil is permitted, like the dreaded Trichinosis ; and the permitted existence of evil we shall never be able to comprehend in our present stage of being. But the presence of the Trichina in man does not appear to be due to any germs obtained direct from the air, but chiefly through the medium of pork. Why was the living flesh of the pig made the flourishing home of the Trichina ? It may have arisen from some unnatural irregularity of man's treatment of his pigs in their filthy sties.

The intestinal worms which flourish in some animals are doubtless there in the same capacity as the bacteria in the human system. There is abnormal matter of disease there, from irregularities, and often in children from irregularities in nursing, of which these internal parasites are curative scavengers ; just as much as are parasites that are external. And so doubtless the presence of the Trichina in the pig was due to a state of flesh or blood so impure, from mismanagement, as to need this hideous consumer of poison or decay, for the arrestment of a greater evil than itself. If not so, we simply know no more reason why its existence is permitted than we know why serpents exist ; with the natural power to slay man with the poison of their deadly fangs. There seems to be no other thoroughfare through the question. Yet I quite believe that the creation of the serpent is in accordance with some wise divine purpose. If man did not eat the diseased pig, and take into his own system the porcine parasite, he would not inherit the pig's misfortune. Perhaps Moses knew something of the Trichina, and its cousins found sometimes in the flesh of the ox, by whatever names they may have been known to the Egyptian conservators of science, and took precautions to keep them out of the bodies of his followers. He altogether prohibited the pig as food, and gave such rules for the examination of the slaughtered ox, that in an unsound condition it never passed for human food among his

people. This Trichinosis in man is abnormal, and does not arise from the ever-present normal life-germs of a normal atmosphere. Herod appears to have died from some such disease, inflicted as a divine punishment for his misdeeds. But we have no right to regard such a death generally as a divine punishment. It might just as reasonably have been a divine blessing. The death of the flesh by some means or other is inevitable to the just and the unjust alike. With the former, Death is the Gate of Life, whether by Trichinosis, the bite of the serpent, fever, cholera, small-pox, the sword, the fiery stake, the block, the flash of lightning, or the painful or the painless death-bed. We no longer consider those whose Gate of Life is opened by the thunder-bolt as the objects of the special anger of Jupiter Tonans. Neither may we regard any other mode of exit from this life as necessarily a divine punishment. Your illustrious brother was wonderfully firm and consistent in the faith that Death was the Gate of Life, by whatever key the gate might happen to be opened.

Admitting all this, and admitting that scarlet fever, cholera, and small-pox, are so many keys of the gate, yet it is certain that the ever-present air-germs are blessings of this life, and conservators of the health and joys of this life's pilgrimage. For although life's joys are transitory, and inevitably mingled with sorrows, the way of the pilgrimage is attended with Beauty and Health and Joy on every hand ; which would be impossible if its air were filled with malignant evils ever pressing around and within the pilgrims. I believe that there is joy as a rule wherever there is sensation, and that the life of the bacterium itself is a life of joy in the fulfilment of its duty. It certainly looks happy enough at its work, and enjoys an excellent appetite. I was impressed with this general joy when I wrote "Morning" on p. 415 of the Jewitt volume. And the common fly, one of the subjects of our consideration, evidently leads a life of joy while it lasts. He is intensely curious about all things that come within his reach, and is always gratifying that curiosity which in itself must be a pleasure so long as he escapes danger. For at the same time he is always getting into danger on account of this same curiosity. Wanting to examine flame he rushes boldly into it, at the cost of his wings. Let the cook open an oven door to see how the tarts are progressing, and he wants to know also, and in he darts at the risk of his life. But I don't think you ever catch him getting into trouble in

regard to pure water. Nor does he care for cold tea. He despairs teetotalism, and, so, often, shortens his days. For he often gets drowned in drinking at the margin of a pool of beer or wine ; as well as the more innocent milk and treacle. Still while life lasts it is generally jolly and luxurious. So with his mother the blue-bottle. She seems to be ever on a happy and wonderfully successful voyage of discovery ; ever singing on the way, or playing some instrument ; and enjoying abundance without the toil of preparing her meals. Still, she also has sometimes her troubles of enchantment. Nature has given that blue-bottle a wonderful power of going straight to hidden dead flesh, even in its inodorous freshness, on her beneficent errand. But Nature seems never to have contemplated man's invention of glass windows, and the blue-bottle will insist that a glass window is a piece of enchantment and nothing else ; and it is amusing to watch her attempts to break through the charm, instead of seeking to go out through the door through which she entered. This enchantment is the more provoking to her because she is always in a great hurry to be off and doing her duty ; and the sharp buzz with which she butts at the glass after twenty failures, to break through the enchantment, sounds remarkably like a sort of impatient swear. Yet her incessant attacks amount to patience after all. Like Uncle Toby in "Tristram Shandy" I have often helped her out of the charm, and put her tenderly out of the room, thinking of his remark that "there is room enough for thee and me in the world"; but she always resents, with that terrible buzz, any attempt of the hand of man to deliver her from her enchantment, which so often proves fatal to the obstinate sisterhood.

LETTER IV.

THEORY OF THE NEBULOUS ORIGIN OF WORLDS FURTHER EXAMINED.—

GRANITE.—HEAT.—THE DIAMOND.—GASES.—WATER.—ICE.—

WEDDING AND DIVORCE OF MATTER.

30 MAY, 1891.



THANK you for kindly enclosing your friend Colonel Bolland's most interesting letter to you. I note the case which somebody puts and he quotes : "Suppose what people call a 'glowing' mass were not properly

called glowing, but a mass at some temperature higher than that which surrounds it, the difference being not very great, and this difference being caused by something of which we know nothing. Suppose this something departed (the reason of its departure being also unknown to us), I see no reason why the results of the nebular theory should not then take place."

The nebular text on which I wrote to you, however, is "enormous masses of glowing gas, or cosmic matter." It is nebulosity by means of intense heat only, and *out in the open*, of which I have spoken ; and to which I have objected as being impossible of long duration. We do know something of the nature of that space which is the "setting" of the cosmic gems, because some of it lies between us and our own gem the sun ; and through it passes the heat from that sun to us, comparatively without warming the space itself. We know nothing of the imagined ether of space, but we know how cold it is from the state of the earth's poles where less of the sun's heat operates than on the rest of the surface of the globe ; although those poles are far from representing the cold of space immediately outside our aerial envelope ; and we know how heat diffuses itself, as just implied, from centres, with the rapidity of light, into and through that space. Then we know something of the materials of worlds and stars from those of our own earth, and the cosmic matter constantly dashing into our atmosphere ; and by the revelations of the spectroscope. And to render these materials nebulous by heat, it would require a temperature sufficient to volatilize iron, platinum, and all the other bases of the earth. If this heat were applied from some active source *outside* a mass of this material and made it nebulous, and that something were then withdrawn, leaving the materials a gaseous glowing cloud, then what I stated must immediately happen. The heat of gaseity must dart off into cold space, by its law of diffusion ; leaving the materials once more solid. The nebular theory will not admit of the elimination of some word equivalent to "glowing" in the description of its nebulae, because it is by the glowing of the mass that it is seen. And those materials would by such a process *have gained nothing to render them more fit than they were before*, for the formation of new stars ; therefore the nebular theory has no reason for its existence. The materials of the earth shew no sign whatever of having ever been subjected to a nebulous condition. On the contrary, the constituents

of granite, which is the chief mother of the fruitful soils of the earth, as I have clearly shewn in my geological writings, are aqueously crystalized, and the grains aqueously cemented. But granite itself is a very compound condition of oxides of the primitive materials of the earth—the simple metals.

To return to the subject of heat, and to use repetition for the sake of emphasis, let us remember that heat darts through space from any source or centre ; and that it is the nature of heat to diffuse itself and equalize itself in anything through which it passes ; accumulating, however, most, in substances which have the most power to resist its passage in its transit through space ; that accumulation being but a temporary hindrance to its flight ; for, still, and for ever, away it flies, on its passage through space. Thus all the gases and liquids of the solar system, if the sun were suddenly quenched, parting with their temporary holding of latent heat, must collapse into their original solids, either simple or compound. There can be no doubt that the gases were solids, which are kept gaseous only by their heat which is latent. This is not theory. The gases are constantly solidifying by natural organic means ; and then, by means of heat, returning to gaseousness. And when they solidify they always give out their latent heat *in a sensific form*. Let us make a circuit with the diamond. There is a positively *simple* crystalized solid. Apply sufficient heat to the diamond, in the presence of oxygen, and it becomes carbonic acid gas ; or the solid carbon expanded to gas, in company with oxygen and *latent* heat. Whatever may have been asserted, you cannot at present reduce it again to the satisfactory crystal, *for want of cold enough*, or absence of heat. But with a practicable reduction of temperature it becomes a liquid. And nature goes further every instant and liberates by some mysterious means the latent heat, rendering it sensific heat, and reduces the carbonic gas to another sort of solid carbon, in the wood, and other solidities, of all vegetation. To repeat again, for emphasis ; whenever a gas is reduced to a liquid, it parts with a part of its latent heat ; which we know, because that heat becomes sensific ; and when it is reduced further, from a liquid to a solid, it parts with the remainder of its latent heat, at least, its heat of liquation, which we also know, because that also becomes sensific. Oxygen and hydrogen gases become liquefied in the compound water. And that formation of water, or vapour of water, is going on constantly

in the combustion of all oils, fat, lighting gas, wood, and coal. Oxygen gas becomes solidified in all oxides of metals. And hydrogen and nitrogen are constantly being solidified in various natural ways, always giving out heat during the operations. I have used the diamond as an illustration. I don't think anyone will assert that carbonic acid gas is an original condition of matter, when he remembers that the carbon of that gas, *before* it was combined with heat and oxygen, was the diamond. This, as I have said, is not theory. The compound water, to which I just referred, affords another illustration of the effects of heat. Combine a certain additional amount of heat with it and it becomes invisible vapour like a gas, in which condition it is abundant in the air, especially every clear cloudless summer day. Let the temperature above be reduced and down it comes in drops of water—its liquid condition. Let the temperature be reduced lower still, and down it comes in morsels of ice—its solid condition. But this is a *compound* of oxygen and hydrogen, wedded together by combustion of hydro-carbons in the oxygenized air ; and as an illustration is not of equal value with the combusted diamond.

I think I am safe in saying that the original condition of all matter, in which I do not include the *life* of matter—light, heat, electricity—is solidity, when we find that all gases and liquids are reducible to solids ; and are only gaseous and liquid when compounded with something else, namely heat.

My substitute for the nebular theory is simply to leave out the nebular theory ; let the solids alone. And let them operate upon one another by their natural chemical affinities ; as we find they have done, and are still doing, in our earth ; all by means of an *external* supply of what we may call *moderate* heat ; which heat is the life of matter ; and without which no gases nor liquids can exist, no affinities are aroused, and no chemical combinations are possible. Let the solids alone ; except such as are by this moderate heat, like that which we receive from the sun, expanded into gases, or dissolved into liquids, that they may become the materials and vehicles of organic life. What is essential in the production of new world-systems is the wedding of matter, not that separation—that divorce of atoms, which would be the condition of nebulosity.

For aught I know Colonel Bolland may be right about the microbes. They may possibly eat something sometimes that may disagree with

them and make them ill ; and their illness may extend to others. It may be so, since doctors themselves do the same thing, at times. Still that would not destroy the character which I claim for them, of beneficent agents normally, and not the appointed breeders of scarlet-fever, cholera, and small-pox.

Colonel Bolland's letter is abundantly suggestive, and his allusion to the Sun brings a flood of thought into my mind. But this letter is already long enough, perhaps too long ; for I fear I am unable to express clearly what is very clear to my own mind ; and in striving for lucidity there is danger of too much wordiness. Perhaps I may ask permission to speak about the Sun in my next letter. Surely that subject ought to bring its own lucidity ! Yet I shall be quite prepared to have my thoughts condemned as a flood of dark waters ; or as dark benighting clouds. But not by you.

LETTER V.

ON THE LIMITED VARIATION OF THE EARTH'S SOLAR HEAT.—ITS EXHAUSTIBILITY.—PROFESSOR CROOKE'S RAY-MILL.—THE RAY-FORCE OF THE SUN.—THE COMET AND THE SUN.—MEASUREMENTS OF THE SUN'S DISTANCE.—PRODUCTS OF COMBUSTION.—THE MYSTERY OF LIGHT AND HEAT.—LUMINOUS PAINT.—FLINT AND STEEL.—OXIDATION OF IRON.—LATENT LIGHT.—COSMIC ELECTRICITY.—THE PATIENCE OF GOD.

8 JUNE, 1891.



OLONEL Bolland in his very interesting letter to you wrote : "No one has yet been able to account for the heat of the sun going on and on, and showing no signs of abating ; and it has not been for want of theories, which have been legion."

There can be no doubt that within certain slight limits of variation the heat which the sun has sent to the earth has been pretty uniform since the present flora and fauna flourished upon it. Much greater heat would have burnt all life to death ; and much less would have frozen all life to death. We cannot suppose much change in the earth's mechanical and chemical condition during that period ; no

material ever leaving the earth's store by any possibility, and none being added to it but the meteoric showers, which have no effect to enable the earth's flora and fauna to bear more or less of heat. At the same time that this comparative uniformity of the earth's temperature is certain, tested by the survival during thousands of years of its animal and vegetable life, so is it equally certain, from what we know of the combustion going on in the sun, that its continuance cannot be eternal, unless there be an eternal supply of fresh material. There will as certainly come a time when the heat and light-giving activity of the sun will be exhausted, unless fresh material be added to its store, as there will come a time when the earth's store of coal will be exhausted, if a fire-making people continue to exist upon it. They are both positively exhaustible quantities. But the Sun is a very big thing indeed, humanly speaking, although the merest speck of gold-dust as a member of the Milky Way. There remains enough material in it to maintain its Sunship among its planets for a "long time" to come, again humanly speaking ; and we need not fear that it will "go out" while there yet remains unincarnated a single soul of the hosts of fallen angels who have to pass through the terrestrial pilgrimage to their redemption. But the mere *decline* of his radiance—a little permanent diminution only—would be fatal to the life of this globe ; and if it be a declining force, as it must be, how does it come to pass that we still live on, millennium after millennium, under a pretty uniform temperature? What a task Colonel Bolland has set me!

I must now arrange a few facts upon the mental table, and then apply them.

You know all about that little Ray-mill, or Light-mill, invented by Mr. William Crookes F.R.S. about 17 or 18 years ago. In it the vanes of a little mill are sent spinning round by the mere force of rays of light, even from a lamp. When I first saw that little machine at work it occurred to me at once how immense must be the impinging force of the radiation from the sun striking against the planets. I may as well here use the words which I wrote on the subject on page 74 of "Hebrew Captives :"

"From the sun are shot forth radiant forces which are as the arms of God stretched out to hold in their respective orbits the weightless spheres of its system ; and to give them their motion therein, and their axial revolutions ; by impinging upon the escarp'd sides of their

mountain-ranges. When the effects of cosmic electricity, and of the force of radiant light, are better understood, then will the sun's mechanical government of its weightless planets and their satellites be also better understood. It is not true that the mountains and mountain-ranges of the earth's surface make it to resemble the uneven surface of an orange. The mountain-ranges, generally, present to the setting sun steep slopes, which, however small they may appear in comparison with the whole globe, are, nevertheless, vast surfaces presented to the impinging force of the sun's rays ; giving axial motion to a globe utterly weightless in space, whatever its comparative size ; a globe as inevitably subject to the action of that actual force as the soap-bubble is subject to the influence of the gentlest breath of a child. And while it is so in regard to the escarpments presented to the west, the eastern slopes generally trail off in such a gradual manner as to present no counteracting vane to the rays darting from the rising sun."

This radiant force is even rendered visible under certain circumstances in the coronal streamers which have been traced to a distance of five millions of miles from the sun ; and the zodiacal, traced in eclipse to ten millions, and during morning and evening twilight to ninety millions. The combustion that is constantly going on in the sun, at the same time that it is a great force darted forth into space, must act with a sort of rebound upon the sun itself. And had that ignition taken place at one side only of the great mass, or greatly preponderated at one side, then the sun must have been shot away into space by its own one-sided force, and have become a great comet. And this reminds me to bring forward the comets as witnesses to this great ray-force of the sun. The comets appear to be vast rockets, obtaining their motion just as our sky-rockets do, by a one-sided force of combustion, but with material enough to last for hundreds of years instead of a few seconds. Newton, perceiving the necessity for supplies of material to the sun to keep up his activity and forces, conceived the idea that the comets were his porters of supply, appointed to gather material in space and dash with it into the great furnace. And the comets are willing enough, and actually attempt to accomplish this office. But the sun will accept nothing from them while he has strength remaining to him to repulse them on their too near approach. It is amusing as well as awful to watch the behaviour

of these stupendous powers one to another. Forced by its own one-sided projectiveness just within the limits of the attractive influence of the sun, the great rocket of space comes up from profundity with increasing speed, drawn by the head and pushed by the tail. The nearer it approaches the great ruler whose kingdom it has entered, the greater is its speed ; for its self-projective force thus far combines with the sun's attraction of gravitation to overpower the sun's repulsion of radiance. At length it appears really about to dash into the solar furnace with its freight of fuel, but the noble orb will have none of its Newtonian cargo. It seems to say "thus far but no farther," and exerting a radiant power which even a prodigious comet in full career cannot penetrate, the rocket is whirled, as if it were at arm's-length, over the sun, in its perihelionic curve, right down on the other side, back into space, urged on by the impetus of that tremendous downward shock exerted by the sun's near-at-home might of radiance. This is the evidence of the comets which enter this system, which we call ours. The ray-power of the sun is sufficient fact to repel the utmost force of the most powerful comet which has ever approached it in humanly historic times. Yet this ray-force must gradually decline without a supply of fresh material, which at present the sun refuses to accept !

Let us now glance at another fact on the mental table. We used to be taught in our school-days that the sun was a certain well-known measured distance from the earth. I have just turned to an old school-book and find these words : "It is known with certainty that the sun is more than ninety-five millions of miles distant from the earth." Those who decided this so positively, and so thoroughly agreed among themselves on the subject, were excellent mathematicians ; quite as knowing and painstaking as any of their successors. Yet now the distance has been measured again, and we are told that the former figure is erroneous, and that the true mean distance is about ninety-two and one third millions. I have not the slightest doubt that when the time comes round again for the next measurement, at the next available Transit of Venus, something more than a century hence, the distance will again have decreased, and *both* previous measurements will be pronounced erroneous ; unless, indeed, by that time, the constant gradual nearing of the planets to the sun be admitted. For if we admit this repulsion of radiance to be a fact,

and its gradual slight decrease a fact, the result would be that the bodies held outward by it would, by their own opposite force of gravitation, press upon the yielding force ever as it yielded, and so compensate themselves for the decline of the fire by drawing nearer to it. And, as I said before, there is a prodigious amount of the light and heat yet left for future use, the glowing sun being as much larger than the earth, as a tennis ball is larger than a grain of sand—not a very exact comparison, but something near enough, and more easy to comprehend than figures. At the same time all the heat that is left would, with only a very slight decline at the present distances, be useless to all the planets—or let us confine ourselves to what we know something about, the earth : *the remaining heat of the sun would be useless to us, prodigious as it is, and would be wasted to us as long as it lasted, if we were not permitted to follow it*; for a very few degrees of permanent reduction would be fatal to all the life of the earth, just as a few degrees of increase—that is, if the comets had their way, and were allowed to fly into the flame of our candle—would burn us up. So a contrivance for our gradual nearer approach to the sun, as his far-reaching heat declines, appears to be a cosmic economical necessity ; and the equal decline of the repulsion of radiance appears to be a natural mechanical consequence of that decline of heat, in itself the needed and natural contrivance.

But while the ray-force, or repulsion of radiance, must thus decline, the sun parts with none of its matter, but only its vitality. We must not think that the combustion of the sun diminishes its matter like the combustion of coal in a grate. In the latter case there is rapid diminution so far as the coal in the grate is concerned, but not so far as the material of the earth is concerned ; which loses nothing. In the process of the combustion of coal the carbon is expanded into carbonic acid gas, in company with oxygen and heat, as in the diamond illustration which I gave ; and it passes out through the chimney-pot into the air, to feed vegetation, and return to new living wood from the long-dead-and-buried changed fossil wood of the coal ; while another of the products of the combustion—the hydrogen, unites with some more of the oxygen of the air and actually produces watery vapour ; which, when it ascends from the heat of the fire-place and chimney into the cool air, falls as dew to the earth, to become some of the water of life to the plants and animals—another resurrec-

tion from death to life. I have remarked before that the same creation of water takes place in the combustion of oil and lighting-gas, *which you may witness* by fixing the cool glass chimney to a lighted lamp, and withdrawing it as soon as you see the interior clouded with condensed steam, before the glass has had time to get hot and throw off that condensed steam as invisible vapour. Or you may observe the condensed newly-created water by holding over the chimney of a lighted lamp, a thick cold vessel, thick and cold enough to resist the heat of the light for half a minute. The water will condense upon that cold surface.

The heat which produces the gaseity of the carbon, and the liquidity of the combined oxygen and hydrogen, is not lost at present, but is merely latent—unfelt in the cold air and in the cold water; but it is still positively there in constant passage into cold space, and re-supply, and the final balance will again become sensific warmth when the materials which it holds gaseous and liquid are again solidified in either the vegetable or animal world.

I remember writing in a previous letter about this latent heat of gaseity and of liquidity. And there is actually another latent heat, of solidity, also. And wonderful to know, that latent heat of solidity is accompanied also with latent light of solidity. The combined unfelt heat and unseen light appear to pervade all solids, and the dual *mystery* becomes revealed to the touch and to the eye by blows and by friction. For what is that combination of Light and Heat in *any* of its forms? A mystery. Molecular Motion? Still a mystery none the less. The theory of molecular motion does not let one single ray more of light upon Light. We have this latent light beautifully revealed in the electric light; but can reveal none of its mystery. The light and the heat go together even though the light be concealed in darkness and the heat be hidden in cold. You will remember the material called Luminous Paint, which has the power of absorbing daylight during the day, and retaining it, and exhibiting it as a soft bluish light, fainter and fainter, during half the night. Some years ago I had a piece of window-glass painted on one side with it and kept in the dark during the day so that at night it was perfectly lightless. Then, in the dark I placed my warm hand flat upon the glassy side, and after awhile on removing my hand, the luminous print or impression of it was quite distinct. The warmth of my hand

had carried light with it through the glass to the luminous paint and aroused a luminosity that lingered as the daylight would have done, but in a much fainter degree.

The results obtained from the abrasive impact of the old flint-and-steel, and the old gun-lock, are a beautiful instance of light and heat evolved from dark cold iron most interestingly intensified by the combustion of the small particles of metal scratched off by the flint. Oxygen has a great affinity for iron, as witnessed in the general rapid formation of rust. The small particles of iron scratched off by the flint being hot and exposed all around to the oxygen of the air, that gas, excited by the heat of the particles, adds its own heat and light of gaseity to them, in solidifying itself into the iron, to form oxide of iron. Hence the intense brilliancy of the little star, and the heat sufficient in so small an atom to ignite the tinder or the powder.

I have no doubt that the attraction of gravitation and the repulsion of radiance will ultimately be found to be the same as the so-called negative and positive conditions of electricity, or properties of insulation and transmission.

Let me say another word about the Nebular Theory: We must remember that the light of gaseity, of which I have spoken so often, is no aid to that theory. In the spark from the flint-and-steel it was aroused and gone instantly, like the flash of lightning, which is itself only a larger development of similar light. The glowing light of burning gas is only a brief temporary condition or action, leaving the gas no longer gas. The latent light is invisible while latent, and can only become glowing when no longer latent but in the act of liberation and *flight*. While that mass of nebulae in distant space is *glowing* permanently, and is only known to us because of its so visible glow.

Now I trust I am drawing to a close this fearfully long letter, dealing with a mystery on which I can throw no light because it is Light itself; but we may yet learn more of the laws of this "cosmic electricity" in which I include day-light, gaseity-light, liquidity-light, and solidity-light. It is certainly the Life of Matter with its accompanying Heat. Suppose we regard it as the Divine Essence: where shall we be then? Fire worshippers again! It is evidently only a servant and instrument of the inscrutable Creator and Preserver; and, mighty and universal as it is, it submits to be the ready obedient servant of man; as obediently illuminating the Temple of God its

Master, as houses and dens and scenes of Folly and Wickedness. It does not strike down the sinner for any sin committed in the light of its presence *however heinous*. And for that matter it might yet be the Eye of God, Himself, for neither does He. So patient and unhurried is His rule of all things.

LETTER VI.

THE LIGHT OF COMETS AND OF THE SUN.—NEBULÆ AGAIN.—METEORS, OR THE MATERIALS OF PLANETS.—THEIR COMBUSTION IN OUR ATMOSPHERE.—HEAT AND LIGHT OF GASEITY.—THE LAW OF GRAVITY.—SUB-OXIDATION OF EARLY FERRUGINOUS ROCKS.—EXAMINATION OF FALSELY-CALLED IGNEOUS ROCKS.—MIRACLE-WORKING BASALT.—ON “THE COSMOS AND THE LOGOS.”—MORE ABOUT FLIES, AND GERMS IN THE AIR.

14 JUNE, 1891.

 ET us now return to “Modern Science and Modern Thought.” On page 16 reference is made to the extreme tenuity of the tails of comets, and the author says: “If the tail, for instance, of the comet of 1843 had consisted of the lightest substance known to us, hydrogen gas, its mass would have exceeded that of the sun, and every planet would have been dragged from its orbit. As Proctor says, therefore: ‘A jar-full of air would probably have outweighed hundreds of cubic miles of that vast appendage which blazed across the skies to the terror of the ignorant and superstitious.’”

As nothing can be lighter than nothing at all, we have, surely, here, the nothing at all in weight or substance; but merely light streaming from, and ever replenished by, the burning end, or more fiercely burning end, of the nucleus; like the light streaming from the sun, traceable, although we are in the midst of its brightness, far away into space, as I mentioned in my last letter. And had those streaming rays emanated from one end only of our own sun, and could we have beheld its nucleus and streaming light farther away from us, outside its bathing brightness, so as to perceive the whole figured upon the dark back-ground of space, as we see the comets at

night, there would have been another enormous comet complete, with tail immensely greater than that of 1843, yet so much lighter than hydrogen gas, because it is only light itself. See how our very language lends itself to this thought.

On page 18 reference is again made to "nebulæ" thus, speaking of the *law of gravity*: "We can discern it operating in those astronomical changes by which cosmic matter has been condensed into nebulæ, nebulæ into suns throwing off planets, and planets throwing off satellites, as they cooled and contracted." How possibly could suns by the means of the law of gravity throw off planets, and planets throw off satellites? The true action of gravity, or the attraction of gravitation, in the construction of planets is not so difficult to ascertain that we need invent a nebulous hot beginning, which is an *impossible beginning*. The loose materials of planets still float about in space, weightless, as dust floats in our atmosphere, but more utterly weightless than that. Let us again speak of our own earth, instead of planets generally, and therefore of what we see and know. This loose weightless dust of space consisting of solid simple bits of metal, and compounds also, of all sizes, which would weigh on the earth's surface from thousands of tons to a few ounces—these fragments when approached by the earth and brought within the sphere of its attraction of gravitation, move towards it, at first very slowly, but with gradually increasing velocity; until they reach our atmosphere. Then it is that we *know* of their existence and approach, if we happen to be looking in their direction; because they become brightly visible, and we can witness their motion and the increase of their speed. Suppose this material to be a mass of iron, which it very often is, for iron is a very needful constituent of a planet like ours, and of creatures like ourselves. I spoke before of friction and blows developing the latent heat and light of solids, and gave the illustration of the minute particle of iron struck off in the frictional impact of the flint and steel; and its ignition by the heat so evolved; and its oxidation by the oxygen of the air, because of the great affinity that there is between iron and oxygen, as evinced in rust. In the frictional impact of the mass of meteoric iron with our atmosphere a similar thing happens; but it is chiefly the heat of gaseity that is evolved, the heat which in its latency keeps oxygen and nitrogen gaseous, as air; although the meteoric mass may also contain heat, slightly, gathered from heat-traversed

space ; but not so much as would be held by such a mass of metal within the warmer limits of the earth and its atmosphere. This evolvement of heat and its transference to the metal gives the oxygen an opportunity of gratifying its affinity for the iron and it unites itself with it as a solid, forming oxide of iron, and at the same time increases the luminosity of the meteor by giving forth all its heat and light of gaseity. And if the meteoric mass be large enough this combustion and solidification of oxygen goes on until what remains of the original metal reaches the earth or sea, and dashes into it a red hot mass, there to cool ; while the combusted portion has become fine dust of red oxide, and sinks at leisure to the surface of the earth. I have seen the larger meteors dash to the earth on several occasions, and been near enough to hear the loud report of the concussion on two occasions. And everybody has seen the smaller ones dash into the sky as brief shooting stars, quickly reduced to oxide. Thus all the materials of the planets may have originally been brought together from comparatively small beginnings when space was more crowded than it now is with loose world-matter. But before an atmosphere encompassed the earth the contributions from space to the accumulating mass would not be burnt in their approach through that which did not exist to ignite them ; and the force of impact of contact in the early days of the formation of the planets would be very slight, which we know from what we know of the law of gravitation. But as to "suns throwing off planets, and planets throwing off satellites" by "the law of gravity," I fail to see any excuse for the thought, which is in opposition to what we know of the law of gravity. It may be in place to mention here, while we are thinking of the effect of air upon iron, that while our atmosphere, as at present constituted, so readily peroxidizes iron, changing it to red rust, the metal being therein united to as much oxygen as it can take, it was not always so. For a long time, even after animal life flourished upon the globe, the proportion of free oxygen in the atmosphere was much less than it is now, so that iron could only obtain a smaller amount of oxygen, and became a bluish protoxide instead of red peroxide. It retains that colour and condition to this day in some of the old rocks which are compact, such as the Silurian slates, the colour of which is due to this iron in its early low stage of oxidation. Old sandstones which are very porous and admit the present air freely, have since become

peroxidized and red, like the old Red Sandstone, very compact strata in which, however, in the interior, still retain the bluish grey tint like the Silurian slate ; while the latter rocks now become covered with a fine red rust on the surface as they decompose. And the reason for this sub-oxidation of the early rocks was this : The air contained as much oxygen then, thereabout, as now, but a vast quantity of it was employed in holding the carbon gaseous, as carbonic acid gas, and was not at liberty then to wed anything else. The animals of that period were, of course, adapted to such an atmosphere, being cold-blooded reptiles. This reminds me of the beautiful working of *one* little department of active preparation for the coming Man. The carbon was gaseous in the air as I have said. It was to become fuel for future Man, and it rapidly became solidified in living vegetation, which was very dense, and very frequently gathered in by nature's provision, as effectively as if it had been mown down by great scythes, and it was stored away and covered up at the bottoms of the lakes, as I have explained in "Cloud Hill" and its Addendum. Thus as the carbonic acid gas became solidified it gave back its free oxygen to the air, until at length that air became ready to be the breath of life of the Man who was to inherit and use the stores of coal, which had liberated his needed oxygen.

It is curious that although the pre-carboniferous atmosphere contained less free oxygen than subsequently, the iron did not take to itself its full capacity for that oxygen, even if it took longer in absorbing it. But the old rocks and oxides prove that it did not ; and under similar conditions it still does not. In firing a *red* tile we simply let the air pass freely through the oven during the firing. But if we want a *blue* tile we obtain it from the very same clay by firing with less free passage of the natural atmosphere, and, consequently, more of the carbonic acid gas of the coal. The bricks and tiles so fired are the colour of the Silurian rocks, and the Silurian rock when fired in the *red* brick oven, with plenty of air, becomes red itself.

I shall pass over the geological Heat theory of Chapter II. of "Modern Science and Modern Thought" as it would take too long to deal with in these letters, and I have already examined the subject in my M.S. geological papers, and shewn that the Laurentian rocks are not igneous but aqueous. I will, however, just briefly refer to two paragraphs on page 27 :

"In the lowest [strata], the Laurentian, the only faint trace of life discovered is that of the Eozoon Canadense, which is considered to be an undoubted petrifaction of a foraminiferous living organism with a chambered shell.

"It must be remembered, however, that these earliest formations have been so changed by slow crystallization under great heat and pressure that all fossils and nearly all traces of stratification must have been obliterated." The theory, for which Mr Laing is again irresponsible, is that these rocks have been constantly and gradually cooling down from a hot nebulous condition: not that they have been aqueous and *afterwards* igneous and melted, and then cooled down again. How then could the Eozoon Canadense, a "living organism with a chambered shell," have existed in the locality of those rocks, either *before* or *during* the slow crystallization under great heat and pressure? This organism is crystallized in the rock itself, therefore did not arrive there after the crystallization, and the pre-crystalline state is said to be "melted with intense heat." No one argues that these Laurentian creatures might have had Salamander constitutions.

Some of the *so-called* igneous rocks are actually found of very considerable thickness spread over beds of coal of the Carboniferous period, and the coal unchanged! I have myself been down in the deep coal seams beneath the roof of basalt, and studied the question *in situ* indeed. This basalt is supposed to have been squeezed up in a molten state from molten depths below the coal, and to have *inserted itself* horizontally above the coal seam, between it and the stratum immediately above it; lifting up the whole superstructure of strata above it by its own molten force, to make horizontal way for its liquid self, to settle all aglow upon that coal, without burning it or changing it in any way—a sandwich of coal with fire above and fire below—yet coal unchanged! To maintain the igneous theory such faith as this is necessary. But the fact is I have examined all these *so-called* igneous rocks, testing them with fire and common sense, and I find them all aqueous rocks. The basalt and the granite rocks have never been melted at all, but are the detritus of still older rocks, broken up, and some of it rounded, and then cemented together, generally with an aqueous solution of silica. The action of a moderate heat is to undo this aqueous cementation, and cause the whole to crumble into grains again. But a great heat really melts the whole into a solid

mass, as in the volcanoes ; but it is then a very different thing, and is no longer granite or basalt, from the inevitable effects of melting heat upon the constituents, whether under great pressure or not.

It was not until yesterday that I could find an opportunity to read the Seventh Lecture of “The Cosmos and the Logos” which you kindly sent to me.

The writer of the book has well devoured the various cosmic, macrocosmic and microcosmic, and other theories, and has re-arranged them with much vigour and ingenuity—I was about to have said digested them—and has adapted them to his purposes with much eloquence of display. But the numerous imaginings of many minds with which he deals, form, on the whole, a pretty considerable chaos, in the midst of which he is, in my humble opinion, the Blind leading the Blind. My most thorough idea of bewilderment is that of the sentient blind tossed about in chaos where there is nothing solidly real. To review the book thoroughly would be to produce another book as large as itself. All I need refer to is the seventh lecture, and say that it is to my mind absurd to ascribe any influence upon the development of the vegetable world from the “direct influx” therein of the human mind (p. 282). The idea of the “macrocosm” being “the *outborn* image of the microcosm”—the last word signifying *man*, is too absurd even for discussion. What presumption it is to declare, for how can any of us know, that plants are “the outborn expressions of human principles in some pre-existing world.” (p. 275). That word “pre-existing” is to meet the difficulty that the earth was a very floral affair long before man appeared upon it, to influence the vegetable development by the “direct influx” of his mind ; and that Adam and Eve did not originate the creation of the flora of their Eden Paradise in this life, because they found the place ready flourishing when they entered it. This statement that an effect is produced by the human mind upon the development of vegetation without manual or mechanical labour (p. 283) is very presumptuous and baseless. And the materials used by the author to illustrate and support his wild theories are necessarily as unsubstantial as the theories themselves. The bulk of the “They say” matter will not be found to be fact on examination. For instance, the metamorphosis of the mountain heather to sweet white clover by means of a dressing of lime. What a wealth of sheep and cattle might be raised on the hills of lovely

Wales if the idle folk would only take the trouble to give them a dressing of lime, and thereby change the heather to sweet white clover! These illustrations and supports, so eloquently utilized, all require among them, not a grain, but a whole bushel, of salt—in place of the lime. He takes hold of block after block of material, which he takes to be rock-crystal, for his foundations, and they are merely blocks of thawing ice. Such writers fearfully waste the time of credulous mankind, and the mirages which they manage to create in the air take also valuable time to dissipate and expose as mere mirages.

The author appears to me very misty indeed in some parts of the book, and on page 288 he seems to try to shew that decomposed vegetable substances, or the results of the decomposition, re-combine in some way and form *incipient animal germs*. On p. 289 he attempts to prove this by the appearance in the summer-time of animalculæ in water, vinegar, and paste. The microscope and the study of these things was the enchanting pursuit of my childhood, but I came to very different conclusions from those of the author of "The Cosmos and the Logos."

We have already investigated the fact that in warm weather animalculæ are generated in water which holds in suspension dead vegetable matter; also in vinegar; and in paste. And we have seen that these animalculæ are different in each of these three different elements of generation. We have seen that the atmosphere is full of germs of life so small as to be invisible to the natural eye—protomicrobes, or floating eggs, each ever ready to burst into organic animal life when plunged into an element suited to its development, and to the fulfilment of its destiny. Whence these germs were derived has been a general mystery. But their universal existence, terrestrially speaking, has been fully demonstrated. We have found out one of the great sources of their supply. We have seen that the omnipresent common fly, regarded generally as a mere impudent little pest, is indeed a wonderful and wonderfully beneficent agent in the exercise of that "Art by which God governs the universe." We have observed that in the autumn large numbers of these flies become gradually more and more distended, and proportionately tame at the same time. We have seen at last that these special flies, in the accomplishment of their special destiny, instead of falling to the earth at their death,

spend their very last moments in suspending themselves from the ceiling, or the columns, or the walls, or windows, of a building ; but out of doors they are pendent from tree-trunks, or branches, or rocks, or anything. This pendent condition is part of the said "art" and therefore the God-taught fly assumes it, and is provided just during those last moments with a strong glue oozing from its proboscis. As soon as this pendency is accomplished the great object of its existence becomes accomplished also. The distention of the abdomen culminates in an explosion and death, and the emission from the rings of the abdomen into the air of tens of thousands of germs in a fine white cloud, which dissipates, and disappears from the gaze like a small puff of steam. I have told you how I caught some of this on glass, as a fine mist, and examined it under the microscope, when each particle constituting the patch of mist became separately revealed as a round egg. After awhile, as I before explained, each globule became somewhat shrunken by the cold, like the shrinkage of an old apple. I then raised the temperature slightly and they each became distended to their original round shining fulness ; shewing that the inner protoplasm was semi-fluid, and was held in a soft skin.

This operation of the omnipresent flies fills the lower atmosphere of all the round world with these animal germs ; and they move about in the air which we breathe, so small as to be invisible to us, in every breeze. There is no theory in this. Some naturalists have observed these events of the last days of the flies, and have pitied them as the victims of some cruel disease. But that does not tally with the beneficence of the said "art" as universally shewn, nor with the evident *purpose* of the *pendency*, and the special supply of glue furnished to the proboscis at the last moment for that purpose. All is arranged to give this animal germ-dust the widest circulation in the air, through which it is too light to sink by its own gravity, and in which its abundance never ceases to be tossed about, although a due proportion is carried down by raindrops to do duty in and upon the ground, and in the waters. Here we certainly have animal germs in the air, in abundance, and without any theorizing. We cannot help inhaling them in breathing, and they are hatched into life within us, and are certainly harmless, if they were not even necessary to the art of government of our normal physical condition. It is to me evident that these same animal germs, as I have before expressed to you,

develop differently in the different media into which they happen to be thrown. In the water which has served for your cut-flowers you will find them employed in ravenously feeding upon the decaying particles of vegetation, and so turning the death into life in the development of their own little bodies, just as their parents, the larvæ offspring of the blow-fly did with the dead flesh left to decay above the surface of the earth. In vinegar the little animal germ develops into a snake, and there he performs a duty which is at present unknown to me. In paste he develops differently again, and does similar duty to his cousin in the corrupt water of the cut-flowers, helping to conserve the sweetness of our atmosphere. All this operation of nature, or of the art by which God governs the universe, is perfectly beneficent ; and those who would destroy all these animal germs if they could, would, innocently, destroy the order and health of all animated nature. Wherever there is something in nature requiring scavengers, nature provides scavengers to eat it up ; even in the instances of disorder and disease in individual lives—during the appointed days or periods of those lives. Decomposing matter which is buried deeply in the earth does not need these living scavengers. There electricity does the work of thorough decomposition, reducing all volatile matter to its original wholesome gases, and sending them up through the porous earth, pure, for re-utilization.

Thus we see how the author of "The Cosmos and the Logos" has been led astray in his surmise that the decay which is the food of the animalculæ, was the actual parent of the same.

If I have written a tediously long letter, please note that it was in obedience to your wish to know what I think of the Seventh Lecture in "The Cosmos and the Logos."

LETTER VII.

THE SUN A MORTAL SATRAP.—BAAL AND APOLLO DEPOSED.—THE SUN'S AGENCY OF BENEFICENCE.—MAN'S LORDSHIP OF THE EARTH.—MAN'S FINAL REPLENISHMENT OF THE EARTH.—EVIDENCES OF ALMIGHTY LOVE THROUGHOUT.—LIGHT AND HEAT A MYSTERIOUS DIVINE ESSENCE.—THE KING, HIS CITY, AND HIS SEPULCHRE.—ETERNAL LIFE AND JOY.—"A STREET IN A CITY."

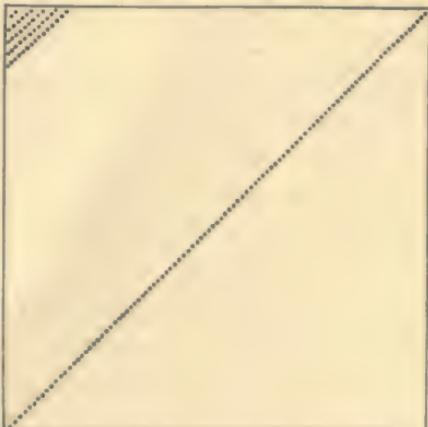
21 JUNE, 1891.



OUR favour of the 14th inst. induces me to ask to be allowed to refer again to the subject of the non-immortality of the Sun. Little as it concerns mortal man, there is a strong natural human desire that the sun should last for ever. Under the influence of that feeling I fully and hopefully thought out the idea mentioned by Colonel Bolland and tried to conceive it possible that the emanations from the sun might by some means return to it. But, no, his immortality can no more be maintained than his godhood. For ages he was worshipped by mankind as Baal the immortal : yet Baal and his worship are dead. As Phœbus Apollo, too, his godhood has perished. From the titles and worship of the Creator and the Supreme he is degraded to the rank of a mere satrap ; a creature ruling a mere province of the Empire of the Eternal, whose laws he administers and fulfils, without even the power of disobedience or deviation. What need or reason is there for his immortality ? Why should there not be some day an accomplishment of the destiny of these few planets of his rule, and then an end to his satrapy ? Look at all his works too, and behold, in them all, the stamp of mortality. Talk of the *everlasting* hills ! he is constantly rasping them down, with even such patient tools as clouds, which he draws up from the sea, and precipitates upon the mountain summits, wearing them, and furrowing their cheeks with streams of tears. Although Apollo has proved mortal, he is still divine as a painter. But look at his sky-pictures of the morning and the evening how they fade ! And the tints of his rainbows are warranted *not* to stand. Then regard his hopeful Spring, how the enamelling of the earth changes ; wonders of beauty succeeding wonders of beauty ; inhabited and enjoyed by no less beautiful and wonderful insect and other life ; but all of brief existence and sure mortality ! It is true there is the resurrection again and again ; but it is only again and again to proclaim mortality. And so pass on the mortal summer and the mortal autumn, full laden with mortal joys and mortal beauties and bounties. And even deathly winter is still beautiful with mortal passing beauty ; the wonderful landscape so chastely silvered with frost, like frosted silver, changes again to the budding spring of young life, both silent and singing, but all again so transient. In all this he is but the mortal agent of mortality ; only

carrying out the inscrutable purposes of the Eternal, which must lead to some ultimate result of which we and the sun are equally ignorant ; but which result being attained, the sun's agency may cease with his simultaneous exhaustion. Thus also in the rearing of beautiful children he is the agent of the Eternal. He nurtures them with warmth and provision of pleasant food, and fills their hearts with a glow of joy and health which stamps them with comeliness and the image of God. Had the sun's mission been merely to rear the creature man for some purpose unaccompanied with man's enjoyment of this life, mortal as it is, human existence might have been maintained with a raw potato ; his garment the natural garment of the monkey ; the wings of the butterfly might have been left unpainted ; and all the flowers unpencilled and perfumeless ; and the birds might have had calls unmelodious to the human ear. But instead of the mere raw potato, the sun is commissioned to rear and ripen for him the peach and the strawberry, the grape and the banana and a hundred other luxuries ; besides the thousand beauties poured in at eye-gate and ear-gate. With such beneficence the child is reared to manhood or womanhood, attended with such beauty and excellence that it seems to have become not only the image of God, but a development of Godhood itself. But, no ; like all that the sun has to do with that is physical, physical humanity also is mortal—mortal womanhood and mortal manhood.

Man seems to be the crowning work of creation so far as this little planet is concerned—the appreciator and utilizer of all its wealth and consummation of beauty and goodness. And let me now touch upon a thought which cannot have escaped your meditations. Man is fully obeying the command, "Be fruitful, and multiply, and replenish the earth, and subdue it." This replenishment, from the first two, began necessarily with slowness, but was continued with ever increasing acceleration. I draw here a square, dotted within, for illustration of what we have now to look forward to :



The first two dots might produce the second line of dots ; and the second might produce the third ; and the third the fourth ; and so on, until the replenishment had reached the central long line of dots ; each increasing line, or generation, being produced in exactly the same space of time as the first generation—the second line in the corner. But now mark with what immensely increasing speed the second half of the square must be filled up, from the immensely increased productiveness of the long line of dots ; increasing each generation in production, with a decreasing space to hold it. Let us suppose that one half of the habitable earth is now populated, the inhabitants being increased not only to the extent of the increase of the length of lines in the square, but to the extent of having filled up all the places of the deceased in the back lines of the square, then we shall see that to fill up the other half will take only a small fraction of the time which it has taken to fill up the first half, starting with the first pair. Thus we see that as surely as the coal *and the iron* of the earth are inevitably exhaustible, so also is the surface of the earth itself, as a habitation for increasing millions, exhaustible; and we have presented to us the approaching end of the present conditions of life and its increase in this globe of ours ; though it may not be for thousands of years yet. That end of terrestrial accommodation for man may be regarded as the end of his need of it. It may be that by that time the streaming pilgrimage of the human race through this mortal life, from somewhere unknown, to somewhere unknown, may be at a happy end. I say “happy” because it is evident that although man is somehow a creature of sorrow, the way of his pilgrimage is all strewn with evidences of Almighty Love, which may be trusted to be continued hereafter, and forever. It would be unreasonable as it would be ungrateful to *expect* unkindness in the house of a powerful friend whose constant love we have proved for years.

Suppose, then, that not only has the earth, at such a time, fulfilled the loving purpose of its creation, but also that the other planets of the solar satrapy have fulfilled theirs, whatever their several destinies may have been ; the sun may by that time have exhausted his splendour, and in his latter days have become as red as blood in his final cooling. For, source of Life and Beauty that he was, it was all life that must die, and beauty that must fade. So let him die also and his beauty fade, when his duty is done and his course is run.

And let us now see, by a few figures, that if all the heat and light which the earth receives from the sun, were reflected back to the sun, it would be hardly worth his acceptance, and could no more save him than the return of a beggar's pittances could save an unfortunate gambling prince from bankruptcy. It has been calculated that the earth only receives about one ray in two thousand millions of the rays emitted from the sun. It will be readily seen that the great bulk of the sun's light and heat darts off into space without being arrested by any of the solar planets. And if all the planets collectively could return their heat and light, second-hand, to the giver, which they cannot, it would amount to only one in about two hundred and twenty-seven millions of parts of the sun's total emission. So you see the return would be useless. All the rest is supposed to be wasted. But there may be more things in space, unseen by us, than are dreamt of in our philosophy. It may be a divine something to immaterial worlds, as it is itself immaterial. It certainly does not go back to the sun. It may be that all space will ultimately be filled with an even and sufficient pervasion of this mysterious divine something for the divine purposes of the Eternal in eternity. There are enough of these burning suns throughout space to justify this thought of an ultimate even pervasion of the emissions. I have already said that this light may be concealed in darkness, and this heat hidden in cold, so far that our physical sense cannot see it nor feel it, yet they are both assuredly there, to be revealed by friction.

Now let us come back to the earth and to the human heart. We naturally dread this idea of a limit to the solar burning. Although we accept the knowledge of our own physical mortality without any concern, we strongly desire that the physical creation with which we are connected—even though that connection shall cease—may last for ever. The Prince to whom is addressed the salutation “O King live for ever!” is only reminded thereby that he must surely die; and, consistently, he sets about preparing his sepulchre. But he hopes and trusts that his sepulchre will last for ever; and that his dynasty will last for ever—generation succeeding generation for ever, to revere his immortal sepulchre. The idea of the ultimate extinction of the sun would trouble him more than the idea of the certain extinction of his own life. So he contemplates his crown and sceptre and all the glorious insignia of his imperial rule which surround him,

and he has satisfaction in the feeling that there is immortality in the divine workmanship and material of these things—in the gold and diamonds and rubies and emeralds. That his name may last *for ever*, although he himself must die, he builds a new city and names it after himself, judging that the sun will rise and set there for ever. Could he have been persuaded that the sun would some day finally lose his fulgence and change to the colour of blood in his cooling, he would never have started the foundations of that magnificent city for his own immortal memorial. Nor would he care so much for the divine workmanship in gold and diamonds and rubies which will carry no beauty into the final terrestrial darkness.

If we are saddened at the thought that our cherished jewels of gold and precious stones must some day have all their beauty quenched in terrestrial darkness, we can compensate ourselves by cherishing all the more the brotherhoods and the sisterhoods of the passing hour ; as a passing link of the eternal future fellowship of the human race redeemed—an eternal fact when all the visible suns of the universe are burnt out. Instead of cherishing stones we can cherish ruby hearts ; helping the feeble, alleviating pain and sorrow, shedding mental light—cherishing brothers and sisters in the spirit of that divine little poem which you sent me to read, entitled, I think, “A Street in a City ;” for happy human hearts are better than rubies, and eyes bright with gladness are better than the finest diamonds. And this was as truly the philosophy of your illustrious brother, as it is your own.

[P.S.—The poem referred to above is this :

A STREET IN A CITY.

I LOVE the quiet ways were man is not,
But only God and nature. Yet still more
I love the crowded city thoroughfares,
Whereon my brothers and my sisters walk,
Often with rapid steps, and thought-knit brows,
Eager, intent, and earnest. Every street
Is like a little world. where deeds are wrought,
And plans are made, and minds go on before
To future destinies. Scarcely they know
What they are passing ; but on every side

The very houses speak to them, and they
Who do not stay to listen, yet must feel
The influence of the stories that they tell
About the past and present.

One I see,

(Though not with bodily eyes) where now the throng
Is thickest, and the urgent life beats on
So closely there is scarcely space for all.
The windows are all pictures. Here are books
That make the gazers long for legacies,
And there are dresses ; here again is food,
And next are man's best works in pottery.
And there are made, in quiet studious rooms,
The sentences that through the daily press
Are makers of opinions. Next are gold
And precious stones, wrought by artistic hands,
And exquisite tellers of the fleeting hours,
And many a costly ornament ; while next
Is bread, white, crisp, and appetising bread
That speaks as certainly as other things
Of national prosperity. A church
Is next, and its sweet chimes peal forth, that all
Who pass may be reminded of the Christ
Who calls the heavy-burdened unto Him,
And gives them rest of soul if they but take
His yoke upon them, and will learn of Him.
Then there are other shops, and next a bank,
And then a court where sad, mistaken men
Reap harvests for their sowing ; and at last,
Past all the buying and the selling scenes,
There stands the hospital, where face to face
With death, men wait, while science does her best,
And Christian kindness and self-sacrifice
Provide the means of healing. All the walls
Are guarding men and women, nor one life
Is without interest. Each story told
Of life and love and labour, joy and woe,
Makes up a book read by the angels, where

They understand, as we do not, the men
Whose complex lives are puzzles to themselves,
And wait revealings.

In the street outside,
There are processions all the busy day,
Men making bargains, women reckoning gains,
Sweet mother-faces, beautiful with love,
Stern, cruel brows, and brave and manly ones,
Lips pressed together in revenge, and eyes
Lighted with laughter. And there are young lives
Bent upon self-destruction, other ones
With heavenward tendencies, who serve the right,
And they will make our England most renowned.
Some bear the marks of utter selfishness,
And some have natures with the self left out.
Some break the hearts that love them ; some have power
To heal and bless all others. Oh ! my God,
What a strange world it is, of young and old,
And good and bad ; and yet I love it all,
For there my comrades walk, and there I hope
That even in every heart there is a germ
Of life eternal. May God bless them all,
My brothers and my sisters, and direct
Our feet at last unto our Father's house !

MARIANNE FARNINGHAM.]

LETTER VIII.

ELECTRICITY, HEAT, AND LIGHT.—DESCRIPTION OF THE SUN.—
METEOROLOGY.—PHAETON AND HIS DISASTER.—CRAG AND
TAIL.—DRIFT.—THE ORIGIN OF THESE LETTERS.—COSMIC
ELECTRICITY.—DE SAUSSURE'S ATMOSPHERIC ELECTROMETER
—CENTRIFUGAL FORCE EXAMINED.

5 JULY, 1891.



En my last letter we dreamt that we had left the sun and returned to the earth ; but it was only a dream in a dreamy letter. That from your friend, which you kindly sent me for perusal and notice, keeps us still a

little longer attracted to the sun ; like the comet about to return from perihelion. But when we have taken this further brief glance at "the great luminary" I hope immediately to descend from the dazzling position, and dive down the parabola like the comet ; not headlong into infinite space however, but into the profundities of "Modern Science and Modern Thought," from which the sun attracted us. Glancing, therefore, once more at the dazzling disk we see that it is by no means a mere "store of electricity, or, in other words, a large cool Battery." I do not object to the word electricity, because I believe that word may eventually be proved to be synonymous with heat and light ; the latter, and electricity, having various conditions of existence and of manifestation, and even of existence with non-manifestation. But I am bound to object to the application of the word "cool" to the sun, although it must, of course, hold enormous stores of heat not yet manifested. It is no more truly cool than it is truly dark. Its emanations are intense radiation of light and heat combined. This radiation, for about a million of miles from the surface, is called the sun's corona, and is thought to consist of burning hydrogen and something else unknown to us. But inasmuch as the corona, although naturally so much more intense near its source, graduates off and streams away, as I said in a previous letter, many millions of miles into space, and seems to reach, with, of course, very greatly diminished intensity, the most distant planets, it must be merely that mysterious dual something—light and heat ; and is certainly not hydrogen combined with some other combustible. The so-called sierra of the sun, which forms the base of the corona, is actually a red-hot burning eruptive something, like an ocean of molten matter, rolling terrible mountains high, and sending up fiery spouts of 20,000, 50,000, 70,000 and sometimes 100,000 miles in height ; whence they gradually settle down again ; and fiery clouds are sent up very much higher. But these things do not dart off into space, any more than do our terrestrial waterspouts and clouds and atmosphere. Why such a condition and appearance of matter as this red fiery ocean should be called the *sierra*, a Spanish-Latin word signifying a saw-like ridge of craggy rocks, it is difficult to comprehend. But such silly nomenclature very often happens in science. A more appropriate name would have been the Solar Red Sea, or Ocean of Fire. This so-called sierra or chromatosphere, is certainly

hot flaming matter, and no part of a cool battery. And it is this which consists of the burning hydrogen and other matter unknown to us. And these burning gases are more like an ocean of molten matter on the sun's surface, than mere gases with us, because all things are about twenty-seven and three-quarter times heavier at the apparent surface of the sun, than at the surface of the earth ; on account of the so much greater attraction of gravity of its greater bulk. While we are yet gazing at the sun, and the eruptions of its sierra, and its coronal streamers, it will be as well to note that the flames which here and there dart up from the fiery ocean to distances from 20,000 to 100,000 miles or more, give irregularity to the rays of glory of the corona and coronal streamers, causing more far-reaching effulgence above and beyond where the flames dart forth than from the average surface. Now when these one-hundred-thousand-mile tongues of fire happen to project towards the earth, it is but reasonable to expect that we should get more heat than from the normal radiance. And as this certainly happens, and happens so irregularly that it can never be calculated and foretold, so it is as certain that meteorology will never be able to forecast temperatures, and the consequences of temperatures, which depend upon the length of these tongues of fire, and their occurrence or non-occurrence just at the point of solar radiation which supplies this earth.

It seems more than probable that one of these extra energetic eruptions of the sierra gave rise to the classic story of Phaeton. The lively, handsome, and ambitious Phaeton, you will remember, was the son of Phœbus Apollo—the Effulgent Sun, and Clymene. This headstrong youth is said to have induced his father to permit him, just for one day, to drive the Day-car. But the steeds of the Sun, finding themselves driven by an unaccustomed hand, became unruly, and dashed from the usual track at the risk of causing universal conflagration ; which Jupiter perceiving, he struck the presumptuous youth from the chariot with one of his thunderbolts, and hurled him headlong from heaven into one of the rivers of the earth. And now let us also descend, without the aid of a thunderbolt, from heaven to earth.

Your friend, who has taken such kind interest in my letters, asks, in reference to the steep escarpments which prevail westward in the mountain ranges in contrast to the gentle or obtuse slopes of their

eastern trail, "Does not the rotation of the earth from West to East cause the line of sharp upheaval of mountains on their westerly sides, rather than the radiance of the solar ray, which must shine on *each side* of a mountain in the daily rotation of the earth?" My reference to this subject on page 74 of "Hebrew Captives" has evidently been misunderstood, and I am sure it is my own fault. I so regret my want of clearness on some occasions. I presume the solar rays have had nothing to do, in a direct manner, with either the "crag" or the "tail" formation of the mountains; but simply impinge upon the crag which is presented to their impingement, the tail presenting no such surface. The direct cause of the crag, or escarpment, so far as I have been able to observe, has been the action of ocean waves beating against mountains from the west and north-west, as the mountains gradually arose from the sea. I referred to this in "Cloud Hill" page 22 (1881) when accounting for the "Drift" as we find it, thus—speaking of the Cheshire Plain from the summit of Cloud Hill: "Now, of Drift, truly so-called, there is abundance on this plain, and among these hills—clay, sand, and stones, mingled together by the last action of the waves upon the land surface, when there was no longer any deep water for their separation by natural gravity into layers.

"And there was once a great Drift-force in operation over all this land to which I will now draw brief attention. I need not say that the greatest might of the ocean operates at, and near, its surface. Its tidal force is greatest at its surface; and the force with which it breaks up rocks lies in its *Æolus*-driven billows. That surfacial force of the ocean would most powerfully operate upon the land when the land was just rising to the surface of the sea, from the sovereignty of the ocean to the sovereignty of the air. The parting blows of its late ruler would be mightiest just before the final retreat. First it would assault the mountain-tops as they were gradually reared up to the sea-level, and break great fragments off them to roll them below. And as the mountains arose, stage by stage, as indicated in the terraces of the High Peak to the north-east yonder, and elsewhere, the power of the waves would drive the detritus together into the most sheltered spots, and the repeated operation of attack and retreat would produce the lateral and terminal moraines. It will be seen that this final force of a retiring ocean, sweeping over the land to and fro for awhile with its *æolian* and tidal violence, *must* have produced such a result as the

blended Drift, just as we find it, whatever other agencies may have had power to do the same. Evidently, true Drift is the consequence of the arrestment of Stratification in the final act of denudation. And this Drift-force, so unlike the amazing theories which have been dragged from the regions of imagination, is but retrospect fact, which can never be eliminated from the history of the gradual emersion of the land from the sea. The superior force with which the billows would dash over the land from the north and west, with the full oceanic impetus of tide and storm, is registered in the steep escarpment of this and other mountains, while the more gentle back-flow of the waters accounts for the more gentle slopes to the south and east."

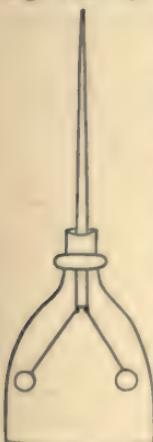
The Drift here referred to does not belong to our subject, but the *operation* of laying down the Drift does, inasmuch as our escarpments are produced by the same means at the same time. How the mountains of the earth come to have their escarpments so generally facing the west, so that they act as vanes for the impingement of the solar rays, God only knows, as He has made them so ; and the results are our nights and days, and the splendours and music of morn and eve.

Since writing the foregoing I am favoured with a sight of Colonel Bolland's interesting letter to you of the 30th ulto. I am the more pleased to learn that he likes the letters because he is not only the author of those very learned books "The Ages in Genesis I and II," and "God the King of the Ages," but, in a manner, of these letters also, because they are written entirely at his suggestion—when he asked you to send Mr Laing's book to me to review. I only hope that they may not yet become awfully wearisome to you. Referring now to Colonel Bolland's above-named letter : When I asserted the impossibility of the return to the sun of any of the light and heat transmitted from it into space, I certainly had in my mind only the light and heat which I have spoken of as "sensific"—like the light seen *glowing* in those mysterious patches in stellar space, which I fail to regard as nebulous embryonic "universes." Please remember that the word "universes" is not mine and I don't approve of it. Colonel Bolland's suggestion that light and heat in the condition of so-called positive and negative electricity, or in the possible condition, as I have hinted, of attraction of gravitation and repulsion of radiance, may "circulate to and from the sun in an electrical circuit," is unanswerable, and may be a great truth. By this means a part of that

227 millionth part of the sun's rays which reach the planets of the solar system may be returned to him. I say "a part" because when the light darts from the sun, racing through space at the rate of about twelve millions of miles in a minute, and reaches a planet, a part only is absorbed, and a part is splashed off into space, reflected and radiated from the convexity against which it impinges. Colonel Bolland asks: Does the repulsion of radiance move the planets and moons in their orbits and on their axes? I think so. I have no doubt of it. But as I said on page 74 of "Hebrew Captives" "When the effects of cosmic electricity and of the impinging force of light, are better understood, then will the sun's mechanical government of its weightless planets and their satellites be also better understood." And then only.

The earth is found to be charged with electricity in the negative, or repellent, condition. If the moon be similarly charged, then you have them holding one another at arm's length; and there is a sufficient reason for their present relationship. Such a relationship by the repulsion of radiance, is prettily illustrated in De Saussure's Atmospheric Electrometer, in which two small pith balls are suspended by two separate fine threads of metal, side by side, from a copper rod, the appendages being enclosed in a glass bottle, from the neck of which, part of the copper rod projects. If the negative, or resinous, or repellent, state of electricity be excited in a stick of sealing wax by friction, and that electricity be communicated to the

copper rod from the wax, it will immediately pass to the pith balls which were touching each other, and they will start apart, and remain apart by mutual repulsion, in mutual resistance of the attraction of gravitation, so long as the negative electricity lasts. Here is an illustration of the little pith balls sulking with each other. And this is a miniature illustration of what I mean by "cosmic electricity"; which I do not intend ever to attempt to elucidate, but shall leave it to others; content in this matter with the wisdom of knowing that *I know not*; and that there is something to be learned in that direction.



As to centrifugal force, I have studied that idea thoroughly, and never could make anything of it. It never presented itself to my mind as a mystery, but as an erroneous conception. Firstly: Even if

stellar space, or the space of the solar system, were utter vacuum, I do not see why a body set moving in it, by one initial impulse, must necessarily move on for ever ; that one initial impulse becoming an eternal and inexhaustive force. Secondly : It is generally admitted that stellar space is not a perfect vacuum, but is pervaded by an ether, which, by its resistance would certainly ultimately overcome that one initial unsustained impulse ; and bring the body to its original condition of rest. Thirdly : If the two previous objections could be overruled, and the second cannot, yet the moving body being influenced by the attraction of gravitation of a superior, or denser, body, of such a pull as to check its onward course in a straight line, and attach it to itself as by an imaginary string, that moving body, so attracted, must draw gradually nearer and nearer to its attractor ; and describe, instead of one eternal orbit, a contracting spiral course, until it united with its attractor ; the diagram of which course would be like the representation of a watch-spring. While this centrifugal force is to my mind a complete fallacy, the repulsion of radiance is a positive fact, capable of doing all that which the fallacy was invented to do.

In these three subjects of light-and-heat, electricity, and attraction of gravitation, we have apparently three mysteries, which every human mind has failed to fathom. It will be curious if they should ultimately be found to be, as I suspect, not three mysteries but one mystery ; or three apparent avenues to one Blind-alley—including also the mystery of Life.

I was about to have uttered another thought, but this epistolary chapter is surely already too long, and I will reserve the further thought for the next.

LETTER IX.

DIVINE PATIENCE IN OPPOSITION TO DIVINE DESIRE OF HUMAN PRAISE.—THE LORD OF THE SUN ; AND SUN-WORSHIP.—AGE OF THE INHABITED EARTH.—ORIGIN OF COAL.—A PHILOSOPHER'S APPRAISEMENT OF THE WHOLE PLANETARY SYSTEM.

19 JULY, 1891.

LN closing my last letter I was much impressed with a thought, which I feel sure must have occurred to you also during years devoted to the study of the wonders of creation as revealed by the searchings of Science. There is a wide-spread notion that this wonderful world was created, and man, the greatest of its wonders, placed in it as its chief, all for the sake of the guerdon of man's Praise of the Creator. Truly the wonders and beauties and bounties of nature, which are exposed to the most simple and most unsearching child of nature, are enough to inspire boundless praise and gratitude. But how little is naturally revealed compared to that which is hidden, and is only to be discovered by art, and diligent searching, and artificial registration of results ; because life is too short for the work, and it must be handed on, and continued by successive generations. Yes ; all this knowledge of the wonderful wisdom of the working of the physical laws of the Creator—laws of blessing and benefit—is so hidden naturally, and so slow of evolvement by art, that there was evidently no Divine hurry for the Praise. So far from that, it is "Divine Patience" which is written across the heavens and upon all the earth. The study of the Sun, physically and historically, gives especial emphasis to this thought. Compare what is naturally seen and known of the small disk of fire passing daily across the sky, to what has been revealed about it by the searchings of science. The deification of this disk of fire indicated an advance in the knowledge of its grandeur ; and at the same time shewed forth Divine Patience in opposition to Divine Desire of Praise, especially when Sun-worship was the almost universal practice of mankind. In ancient America emperors went to war to enforce the worship of the Sun upon neighbouring peoples, after the manner of the Mohammedan propagation. The Peruvian Incas even forced the worship of the Sun upon neighbours who were better advanced in truth than themselves, and already worshipped "A great Being, the Maker and Sustainer of the universe." "But the Sun they did not care for, as their ground was hot and dry enough." Yet the Lord of the Sun made no angry demonstration against the false worship and false praise, claiming the praise for Himself. What could have been easier than to have sent an angel enthroned upon a cloud in the heavens, heralded with celestial trumpets and gong of

thunders, to deliver a message to the nations denouncing the false worship, saying : " Thus saith the Lord, the Maker and Sustainer of the universe, ' The Sun is no God, but My servant, and the work of My hands. Ye shall have no other Gods but Me.' " But instead of Divine desire for human praise, there was Divine Patience. And we know what doings there were in ancient Asia, Africa, and Europe connected with the worship of the Sun under the titles of Baal, Apollo, Adrammelech, and many more, the hierarchies of which were the most powerful and the most cruel despotisms that ever afflicted mankind. Still there was Divine Patience, and no hurry for the Praise. Yet mark how certainly, after all, by the gentle and gradual evolution of Truth, this universal false religion and its cruel hierarchies have been swept away. As a relic and memorial of this past of our world's history we have still Sunday, this day on which I am writing. And curiously enough, on this day, of all others, now rises in greatest volume from earth to Heaven the anthem of Praise, not to the Sun, but to the Lord of the Sun, the Maker and Sustainer of the universe ; and not a single hymn to Apollo, or Baal, on this which was his especial praise-day long before the birth of Abraham.

It would almost seem that St. Paul had in view the Divine indifference to human praise as shewn in the tardily exhibited wonders of His wisdom, when he wrote of the manifold wisdom of God being " known to principalities and powers in heavenly places." And these words, you will remember, were quoted by your illustrious brother twice in his letters to your sister, Miss Gordon, on pages 99 and 144 of her book. The principalities and powers in heavenly places may be able to see, understand, and appreciate the wisdom, but there is evidently no hurry in exhibiting it for the praise of Man. I now return to the text of the book " Modern Science and Modern Thought."

Mr Laing's conclusions on pages 29-33 ; for which he is not responsible, that " immense series of ages " are " proved by geology to have elapsed since the earth assumed its present condition, became subject to existing laws and fitted to be the abode of life," are not at all established by what he considers the evidences of the " formation known as the Carboniferous." There is no reason whatever to be sparing of time, in calculating the length of the ages of the past, as they must reach back into infinity. But when we come to measure the ages of the earth's past life in years we must not appropriate

millions without reason. Mr. Laing has been led astray in the conclusion respecting the under-clays of the coal-seams that: "Every under-clay was clearly once a surface soil on which the forest vegetation grew, whose accumulated *débris* forms the overlying seam of coal. The under-clays are full of the fibres of roots, and the stools of trees which once grew on them, are constantly found *in situ*, with their roots attached just as they stood when the tree fell, and added to the accumulation of vegetable matter, which in modern times forms peat, and in more ancient days, under different conditions of heat and pressure, took the more consolidated form of coal."

Pressure has certainly been a factor in the consolidation of coal. But it is clear that there can have been no great heat, the effect of which would have been—the very opposite of consolidation—to turn it into gases and steam and force them through the porous superincumbent strata, instead of leaving the carbon and hydrogen aqueously crystallized. And it is not true that "Every under-clay was clearly once a surface soil on which the forest vegetation grew." So far from that, it is the rule that the under-clay in section shews clear lines of stratification, or deposition from water; undisturbed by any signs of vegetable growth in it; which vegetable growth invariably breaks up lines of stratification. Instead of the roots and rootlets of the forest trees, which should be found in the under-clay if it had been the forest soil, there is a distinct clear line of separation between the seam of clay and the seam of coal—a distinct line of cleavage, and no connection by rootage. It is true that fragments of rootlets, and sometimes roots, are found in that stratified under-clay, but they were evidently deposited there with the under-clay itself; because, as I have said, they have not in the least disturbed the sectional lines of deposition. I have handled this subject at full length in "Cloud Hill," and its Addendum (1881), copies of which you have, and have shewn that the vegetation forming coal did not grow where we find the coal. That pamphlet has been commented upon and lectured upon, but not a sentence of it has been shattered yet. Every fragment of rootlet found in the under-clay is entirely disconnected with the seam of coal above, instead of passing into it. I speak, not from the authority of books, but from careful prolonged personal examination of the strata. On page 31 of Mr. Laing's book, coal is spoken of as "principally composed of fine spore dust." It is not so; and he is

not responsible for the statement. He is more correct in stating on the preceding page "When these vegetable remains are examined with the aid of the microscope it is found that these ancient forests consisted mainly of trees like gigantic club-mosses, mare's-tails, and tree-ferns, with a few resembling yews and firs." Of course the microscope does not reveal the magnitude ; that is ascertained from prostrate specimens which have been found. Then he quotes from Dr. Dawson : "We may safely assert that every foot of thickness of pure bituminous coal implies the quiet growth and fall of at least fifty generations of *Sigillaria*, and therefore an undisturbed condition of forest growth, enduring through many centuries." Thus we are told that every foot of coal took many centuries to form. The vegetation of the period was luxuriant and gigantic, indicating an ultra-tropical climate. And the rule of the forest is that the more rapid the growth, the more rapid shall be the decay after death, the same causes operating both ways. How anyone can offer the theory, and how anyone can accept it, that decaying vegetable matter should lie decaying in a hot wet clime, for "many centuries," *and yet not decay*, puzzles me. Suppose Nature suspended her laws for sufficient "many centuries" to allow the first foot of coal to form from the dead and exposed, yet miraculously uncorrupting vegetation ; and then Nature grew tired of the irregularity, and became natural again, and let things take their natural course ; how long should it take for the rain and heat to dissipate that miraculous thickness, instead of letting it alone for many centuries more, for another foot to form upon it ?

The separate coal-seams were deposited, as I have shewn in "Cloud Hill," not during "many centuries," but each in a few weeks at the utmost. And the overlying strata of marl and sand, for the deposition of which *more* "many centuries" are claimed, were deposited, the sand seams in a few minutes, and the mud marl seams upon them in a few days.

The simile of the Mississippi delta is not applicable, and is utterly worthless. And as utterly worthless is every argument used to prove that "the time represented by the Coal formation alone would be six millions of years."

The solidified hydrogen and oxygen in coal so naturally become gaseous and fugitive, that they are constantly escaping upward through the porous strata overlying the coal ; and consequently every

seam lower down, speaking generally, is gradually inferior—as in position, so in gaseousness in burning. This finding would prove nothing as to the age of the whole series, if it were not certain, as it is certain, that the gases are thus fugitive ; and being thus fugitive it is impossible to conceive that any trace of them could remain—as more than traces *do* remain in the *lowest* seams—after a fiftieth part of one of the millions of years, of the six millions claimed for the mere formation only, of the coal ; to say nothing of the many millions more, claimed for subsequent formations, while the coal lay at rest, all the time inevitably parting with its fugitive constituents. Yet these fugitive constituents are far from being exhausted in the upper seams ; and as I have said, even in the lowest seams—the anthracite—there has not been time for the escape of all.

As you have a copy of "Cloud Hill" and its Addendum, I need not repeat here the evidences which I have given there, of the rapidity of the deposition of the Coal Measures. But the year after the printing of that pamphlet I wrote another on the same subject, which has not yet been printed, but will form part of a general geological volume which is ready for the press. Its title is "On the Discovery of the Petrified Ruins of an Ancient Forest," and it is the result of my own careful prolonged examination of the said petrified ruins and their locality ; not underground, cramped and in the dark ; but in the open day, day by day ; during periods of successive discoveries of the fossil trees during excavations running over several years. As I should like to thoroughly justify the objections which I have raised to the "six millions of years," I will ask permission to devote the next epistolary chapter, and perhaps the next, to quotations from the above named MS work, before proceeding to shew that the millions of years claimed also for the formation of the *Chalk* are computed also by fallacies.

It seems, at first sight, a pity that a mole-hill of established error should require a mountain of laborious reasoning to crush. But it is by accumulated persistent efforts to prove the error, that truth is ultimately fully revealed, and the mountain of labour becomes the immovable mountain of truth, brought forth by the mole-hill of error.

And besides the mole-hills of error which take mountains of reasoning to crush, mountains of error have before now been reared upon and around mole-hills of truth. And even truly great philosophers have sometimes been drawn on by their imaginations to pile up these

baseless mountains of calculations and deductions—baseless because extended widely and recklessly outside the only tiny foundation of their original tiny hill of fact. I came across a curious instance of this the other day while casually glancing into John Timbs's "Things not generally Known." It is a progressive calculation of the value and purchasing power of the diamond—attributed to the truly great Sir David Brewster—thus :

"It is difficult to express in words or in numbers the commercial value of the diamond ; but we may truly say, that a string of Koh-i-noors a furlong in length would purchase the fee-simple of the globe, while a ring engirdling the Arctic Zone would buy up the whole planetary system." This indeed is a "Thing not generally Known" ; and it is merciful that it is told in words so few. The single Koh-i-noor is the precious little mole-hill of fact so long as it remains single—Mountain of Light though it be also ; but the moment we produce a row of them one eighth of a mile long, the "commercial value" foundation even of the real little mole-hill collapses and becomes almost nil ; and the calculation and deduction about the fee-simple of the globe share the same fate. And the farther the calculation is extended the wilder and falser it becomes. So that instead of the diamond girdle of the Arctic Zone buying up all the Kingdom of the Sun, and dethroning that mighty Ruler, or perhaps buying him up also in the bargain, it would be more worthless in its plenitude than the same amount of Arctic ice. Because it would not, even some of it, melt itself out of the way, and make room for exploring ships to pass upward, beneath the summer smile of the King. The summer smile of the King when he came up to view this thing, whether it were the northern girdle or skull-cap of his tiny planet—a thing of less worth in its barren plenitude than as much mere fruitful dust ; yet philosophically appraised as of sufficient value to buy up his glorious empire of "the whole planetary system," over his head. Yet all the while the too abundant and barren diamonds are all his own as the Satrap of the King of Kings ; and only resplendent and even visible in the reflection of his own glory !

Such a bit of philosophy would have been unworthy of notice, and best left among the "Things for ever Unknown" had it not been put forth, and published in the "North British Review," by so great a philosopher ; and reproduced by John Timbs, the great friend of my

dear friend Llewellynn Jewitt, as a "Thing not generally Known," but which ought to be known.

LETTER X.

DISCOVERY OF THE PETRIFIED RUINS OF AN ANCIENT FOREST.—

THE SIGILLARIAE.—TREMENDOUS UPHEAVALS AND DEPRESSIONS OF THE EARTH'S PAST.—SNOWDON AND CADER IDRIS.—THE CARBONIFEROUS LANDSCAPE.—THE LEPIDODENDRA, CALAMITES, TREE-FERNS, AND CYCADS.—THE CARBONIFEROUS ATMOSPHERE.—THE STIGMARIA.—COAL AND CLAY SEAMS.

25 JULY, 1891.



HAVE now the pleasure to send you some quotations from my MS paper "On the Discovery of the Petrified Ruins of an Ancient Forest," that they may support my objections to the six millions of years claimed in "Modern Science and Modern Thought" for the formation of the Coal Measures; a support not based upon theories, but upon the evidences of the Coal Measures themselves:

"In the year 1867 some workmen employed in digging at the Eastwood Brick and Marl Works, Hanley, uncovered an erect fossil tree-trunk of a genus which had flourished abundantly for ages, yet had certainly ceased to flourish long before the appearance of man on the earth. The marl obtained at the Eastwood pit is part of the forest soil of that section of the geologic past called the Carboniferous Period. It is chemically composed of silica, alumina, lime, protoxide of iron, and magnesia; while mechanically it is a mixture of clay and fine sand, or quartz-grit, and is used for making fire-bricks, potters' saggars, and other fire-clay articles of pottery. It was, as I have said, part of the fruitful soil of that ancient Carboniferous Period, the wreck of whose luxuriant, wonderful, and beautiful vegetation has been stored up for geologic ages deep in the earth in the form of coal, for the ultimate use of man. Without it there could have been no Iron Age in its full development of our own day. And the fossil tree-trunk was an erect stone monument of that remote time, with a wonderful tale to tell to those who are skilled in the interpretation of the silent language of the rocks. It measured about nine feet in

circumference towards the base, and considerably more at the actual base, where it flanged out and rested on thin strata of clay and coal. It was only the lower fragment of a trunk, however, measuring only eighteen feet in height, while its entire original altitude, judging from other incomplete specimens of the kind which have been found prostrate elsewhere buried in the strata, must have been at least seventy or eighty feet. It had been a great hollow bamboo, and its interior was filled with sand and clay, some portions having become hardened to a fine sandstone. This marly sandstone when broken up was found to abound with embedded fragments of ferns, grasses, twigs, and great reeds ; all jumbled together ; but so clear and perfect in the details of their structure, as to prove that their interment in that mud, when it was mud, was sudden ; while they were yet living and fresh and crisp : leaving no time for gaseous decay before these mud impressions were made. Yes ; this vegetation was buried in its living freshness in the early days of vegetable life ; so suddenly, that it had not drooped nor faded ; though it was torn into fragments ; and its impressions are preserved to this day with far more microscopic exactness and beauty than the seal-work of the most skilful sculptor of gems. The original outer case of the tree was still there in the form of a cylinder of perfect coal about a quarter of an inch in thickness ; and when it was first discovered the broad flutes and all the most minute marks of the living tree were exact and beautiful on the jetty surface. But the cylinder of coal gradually crumbled away, and part of the stone cast remained, impressed with all the delicate markings of the inner surface of the bark or matrix. This tree was of the genus known as *Sigillariæ*, or Seal-stems ; so named because the earliest discovered specimens were all ornamented in the centre of their broad flutes with vertical parallel rows of tubercles like rude seal impressions. The decoration of the interior of the bark corresponded with that of the exterior, but where the one was embossed, the other was indented, so that the stone casts of these trees resembled sculptured reproductions of the trunks in almost their original beauty. These seal marks were possibly the scars left by the previous junction of spines or fronds, but we know nothing certain of either the leaves or branches of this tree. All we know is that after tapering upwards, sixty or seventy feet, the trunk branched into two prongs which bifurcated again and again. Of its ultimate coronal we know nothing ;

no attached specimen having yet been discovered. But this trunk of which I am speaking, and all of its kind that have subsequently been discovered in the same neighbourhood, although they are included in the Seal-stem genus, are of a species without the seal marks. Still it is possible that the upper portions of the same trunks—those portions which have been broken away, may have exhibited the usual seal decorations could we have examined them; the spines or leaves possibly radiating only from the upper part of the stem.

"Since the year 1867 several more of these erect fossil trees have from time to time been left bare by the progress of work in the same marl-pit. But 1882 yielded quite a little grove of them, rendering the place a scene of unusual interest to the geologist, who, by the kindness of the proprietors, Messrs. E. Hampton and Sons, had at all times free access to these fossil ruins. And besides these great upright Seal-stems, round about them were scattered fragments, and clay and sandstone impressions, of other trees; various grasses; and several species of ferns of which I shall speak presently. Yet with all these petrified vestiges of the splendid flora of the past at one's feet, the place was more than ever a place of desolation; and these broken stone columns dotted here and there, rose as the recovered ruins of a sylvan Pompeii. But these were monumental rocks of ages of geologic antiquity; while Pompeii was lost but a geologic yesterday.

"Standing here amid these surroundings the geologist feels sure that he stands upon the actual floor of the ancient forest. He feels sure that these trees in their petrified uprightness are now laid bare to the day resting on the very spot where they first flourished and long beautified the luxuriant Carboniferous horizon; and that they are now disentombed in their stony desolation for the first time since the lovely living landscape of the Coal Age was suddenly overwhelmed and buried in the mud which furnishes the Age of Iron with the fire-clays so essential to the development of its metallic and ceramic industries. We will indulge this faith-at-first-sight for a little while until we have come to the end of a careful examination of everything around us; and will then decide the question by a logical treatment of facts. And if, after that, reason will not permit us to retain the romantic idea that in this great open marl-pit we are wandering among the remains of the mazes of a buried forest of pre-Adamite times; and that these weird stone columns are not the disentombed

vestiges of that venerable sylvan Pompeii in their original place ; we may, perhaps, compensate our imaginations with the assurance that we are, nevertheless, wandering on the no less romantic bottom of one of those deep lakes which nestled among the almost universal forests of the Carboniferous landscape ; and that the forest itself really flourished not far from the spot. Let us first restore the Vision of that landscape here among its undoubted vestiges and ruins, whether they flourished in this exact place, or on plains and slopes above, but close at hand.

"I give here a picture of an ideal forest of the Coal Measure Period, the construction of the details of which has been aided by actual fossils, and which will greatly assist the imagination to realize the luxuriant and ornate character of the coal-flora."

[The original engraving of this beautiful picture illustrates "Under-ground Life ; or Mines and Miners," and the stereotype was furnished to me by the courtesy of the publishers of that work—Messrs Chapman and Hall, through my late dear friend Llewellynn Jewitt in 1882. At the same time and through the same channel, and by corresponding courtesy, I received from Messrs Cassell Petter and Galpin the stereotype of the picture which forms the Frontispiece of this book, and which illustrated their excellent work "Science for All."]

"But the Carboniferous scene, apart from its grand vegetation, must have been strikingly magnificent ; more awful than lovely ; had there been appreciative eyes to behold it. It was the period of great frequently-recurrent land disturbances ; and changes of contour of the horizon ; the bold rugged and precipitous results of which had not yet been worn and softened down by submergence and wave-action, and re-emergence—events which have subsequently happened and done their work. We know this because we find its strata, and the strata beneath, which were deposited level, or nearly level, at the bottom of water, all broken up and tilted at every possible angle in their sections ; and rolled, and crumpled, and twisted into every possible curve ; and their ground-plan, as shewn on geological maps ; is a complete net-work of land-cracks, or 'faults' ; each crack representing a sudden sinkage or upheaval on the one side or the other. Across this marl-pit there runs one of these cracks, and an examination of the edges of the fracture proves that there was a sudden down-slip on the one side or upheaval on the other ; of no

ANOTHER IDEAL LANDSCAPE OF THE COAL-MEASURE PERIOD.



less than two hundred and seventy vertical feet. If before that fracture took place the surface above was level, it probably produced an escarpment 270 feet in height, which has since been completely worn down by marine action ; and the surface replanned to a level on each side of the crack. Another evidence of land disturbance on the same spot is found in the tilt of the strata on which these trees rest, and in which they are embedded. The lines of stratification are all conformable like the edges of a book, and all tilt at an angle of $12\frac{1}{2}$ degrees, dipping from N.E. to S.W., and the trees lean towards the S.W., in the same degree, being perpendicular to the strata. And this uniform tilt of the trees shews that the disturbance took place after they were embedded. These sinkages and upheavals, which are found to have occurred frequently in, and in the neighbourhood of, every known coal-field, would produce generally steep escarpments, overhanging cliffs, awful chasms, the deep furrows of sudden-rushing floods, and general rugged features to which there is no resemblance on the wave-worn rounded face of the now placid earth. We have also evidences in the North Staffordshire Coal-field, to which this marl-pit belongs, of other great disturbances that have happened since the completion of the deposition of the coal-measures and of their superior strata called the Permian and the Triassic. One great crack bounds the field at the north-west and extends miles further northward into Cheshire ; and the western down-slip in this case was more than fifteen hundred feet. There are also two great parallel cracks westward of this marl-pit, extending from N.W. to S.E., with the town of Newcastle between them ; one of which proves a down-throw of more than a thousand feet ; and the other about six hundred feet. These great down-slips or upheavals must have produced enormous escarpments which have since been levelled down by oceanic action. Thus we have indisputable evidences that violent disturbances happened within the area of this our own island at that remote time ; and as we know that such violent commotions have not happened in the same land in historic times, we may reasonably conclude that there were subterranean forces in intermittent operation directly beneath us ; which have gradually burned themselves out, and become exhausted ; in time for man to inherit, and live safely in, this land. Those who deny the occurrence of the upheavals of the past in this land, should, to be consistent, deny also the very existence of Snow-

don and Cader Idris ; for those mountains and their giant fraternity prove by the angles of their strata that they have been elevated above the mean level of the land by uplifting force from below ; and to no other known force of nature can their elevation be assigned ; while every other known force of nature has been steadily applied to their gradual degradation. It is impossible to conceive the devastation which some of these great upheavals must have produced ; when the rivers and lakes were displaced ; and the slopes and the plains were stripped of their magnificent forest growth by the irresistible impetuosity of the rushing floods. Nor is it possible to conceive the grandeur which must have succeeded the terror, when broken stream-channels became cascades ; and great rivers rent across their beds became mighty Niagaras ; while from new crevices in the rocks would rise springs and stately fountains. Nor is it possible to conceive the crowning beauty of the whole when the rugged untraversable landscape became again rapidly robed and adorned with the splendid vegetation of the period. Among the most preponderant and majestic of the new forest trees were probably these Seal-stems, of which there were several species variously ornamented ; from the mere gracefully fluted, to the elaborate and variously sculptured seal decorations. This is probable because the impressions of these trees and their roots are found more predominant than the traces of any other large plant in the coal-strata. Their beautiful tapering shafts piercing the air to the height of from seventy to one hundred feet ; with their unknown coronals ; towered only slightly above the no less elaborately decorated Lepidodendra, or Scale-trees ; with their Scale-armoured bark ; and the delicately ribbed Calamites—deriving their name from *Calamus*, a reed ; plants like gigantic mare's-tails ; sending forth tier above tier of far-reaching rays of green, like huge floral plumes. Some of the stems of these reeds reached a circumference of three feet : their height is unknown ; but must have been correspondingly considerable. And there were great palm-like arborescent or tree-ferns ; and Cycads ; surpassing the most beautiful and vigorous tropical growths of to-day in fruitful Java or the Valley of the Amazon. And while the sky above, had there been appreciative eyes to look upward, was diapered with all these glorious coronal forms of shadowy green, the sunshine pierced through the interstices to illumine the no less lovely diaper of the forest floor. We have the actual fragments

spread around us in this pit. The graceful Asterophyllite, or Star-leaved plant ; species of the Sphenopteris, or Wedge-leaved fern ; Pecopteris, or Comb-leaved fern ; Odontopteris, or Tooth-leaved fern ; Neuropteris, or Nerve-leaved fern ; Cyclopteris, or Round-leaved fern ; and luxuriant grasses, and twigs of unknown genera. But so far as we know there was no appreciative eye to behold all this floral beauty, unless, indeed, there was an appreciation of such beauty in the jewelled eyes of the early ancestors of reptiles and insects, of which some existed in this Age of the Dawn of Terrestrial Life. Or unless all this rugged grandeur and sylvan splendour was enjoyed by the angels, or genii ; or, those ‘sons of God’ mentioned in the sixth chapter of Genesis ; and, curiously enough, in the ancient mythology of the Grecians also ; who visited the earth later on in the early days of man, and were then conquered and held captive by the charms of his lovely daughters ; and became the progenitors of the giants, and of ‘mighty men which were of old, men of renown.’

“ And in days of calm the stillness must have been awful, if there were ears to hear, when out of reach of the monotonous music of fountains and falls. For the silence of the scene was unbroken by the song of bird, the coo of dove, the crow of cock, the bleat of sheep, the low of kine, the bark of dog, the neigh of horse, the bray of ass, the voice of man, or the roar or the howl or the call of any wild creature of the forest. The earth with all its rich abundance of glorious vegetation was not yet ready for the advent of bird or mammal. Its atmosphere was not yet ready to be the breath of life of warm-blooded animals of high organization. This early atmosphere still contained much less free oxygen and much more carbonic acid than the later atmosphere ; from which later atmosphere the carbon of the carbonic acid had been so largely solidified in the coal-flora and coal ; liberating in the process not only vast quantities of vital oxygen, but also a regular and constant addition to the warmth of the forest air. There is not space in this paper for the evidences of these things ; and I will only say now that they are positive ; and that the condition of the early rocks alone affords incontestable chemical proof of that condition of the early atmosphere. But the chemistry of the woods was in active operation solidifying the carbon of carbonic acid ; and, while gathering it for man’s future use in the form of solid carbon, was preparing the atmosphere for the use of the future inheritors of the earth.

And when the tempest raged in those days, the howl of the wind and the rattle among these gigantic bamboos, and the splash of the great rain-drops—which have left their impressions in the buried sands and mud of the great lakes and seashores to this day—with the thunder echoing from a thousand cliffs, must have produced a sublime uproar.

"Let us now carefully examine the strata of this marl-pit, and see if we are really standing upon the floor of the ancient forest or not. We first dig around the tree-trunks to search for and examine the roots. All geologists are now familiar with the roots of the Seal-stems ; although for many years they were a botanic mystery. The trunks were for a long time found without any roots ; and, however difficult to understand, it appeared that the Seal-tree grew a rootless shaft. At the same time a great plant like a tree-root, but without any trunk attached to it, was even more frequently met with in the coal-strata ; and was supposed to be a floating water-plant ; having four great limbs about twenty inches in circumference, radiating horizontally from an axis, and bifurcating over a radius of four or five feet, or a total diameter, including the central axis, of thirteen or fourteen feet. These radiations were invariably decorated with spiral rows of round tubercles set in small depressions, from which the plant, or its supposed genus, was named *Stigmaria*, or Punctured-stem. In course of time, however, it was found that the Seal-stem tree did not grow rootless, nor was the Punctured-stem an independent floating water-plant ; for the latter, at its axis, was found attached to the base of the former as its root. The tubercles of this root were the places of junction of its cord-like rootlets which radiated in every direction, spreading yards away through the soil to gather the necessary moisture and nourishment for the great Seal-stem. Now this punctured root being natural to the Seal-stem, must be found attached to it wherever it is found in the place of its growth. We search for the Punctured-stem at the foot of each of these fossil trunks, but in no instance—in the examination of thirty trees—do we find any trace of a root ; but at the base of each tree we find flanging out like four feet the places whence the four chief stems of the root should have radiated. The Punctured-stem, wherever it is found, is as bold and prominent a fossil as the great Seal-stem itself, and had it ever grown here at the bases of these trunks the carbonized remains must have been visible now. These trunks appear to have been torn away from the soil in

which they grew, leaving their roots behind in that soil, and to have been set up here in another place. For it is impossible to conceive any reasonable natural means whereby the roots and their rootlets, and the soil in which they were anchored, could be removed from beneath the trees, and leave the trees still standing upright in the spot of their growth. But as no other agent of removal than rushing wind or water can be conceived, how came they to be set up here in their upright positions? We must and will solve this mystery; and will shew that in accordance with simple natural laws these particular trunks could not have been placed here in any other than their upright position, after their removal from their roots in another place. Meantime we examine further to see if the band of fine clay in which their bases rest, or the thin band of coal beneath it, could possibly have been the floor of a forest in its original situation, merely submerged and buried. The seam, or band, in which the four flanges of each tree-base rest, is a level seam of very fine gritless clay running all through the several acres of this pit which have yet been excavated eastward of the great crack, and of an almost exactly uniform thickness of four inches and a half, with an exception which I will describe and explain presently. This fine clean seam of clay has evidently been deposited from the waters of a lake in which the fine creamy mud was diffused, and it has evidently not been disturbed by any vegetable growth since it was evenly deposited on the level lake-bottom. Anything growing upward through it, or shooting downward through it, would have left its carbonaceous impression there to this day; for every fragment of fern or grass which was buried in the clays of the coal-strata, has left its impression there as perfect as in fresh life; however delicate may have been its structure. Immediately beneath this seam of fine clay is a seam of coal, which also extends uniformly through all the explored acres of this pit, of a thickness of about three inches, with an exception corresponding with that of the clay seam, to be explained presently. Was this, then, the forest floor upon which the clay settled down after the waters had invaded the forest? A forest floor is a mixture of earth and vegetation, for the mud will wash up and overflow during the wet season; and the dust will be carried by the wind during the dry season; and if even there were no worms at work, the mere expansiveness of various growing rootage would force up the earth into irregularities and mix it with

the vegetation upward. This is not a mixed seam, nor is it irregular in thickness, but a clearly defined three inch seam of coal. A forest floor would be rough and brush-like, or stubbly, on its surface ; with stems of grasses, ferns, or young trees, or even mosses ; and if a seam of fine mud had settled down upon it, its growth would radiate upward more or less into the mud. But this coal, like the seam of clay above it, is a clean and clearly defined layer with a smooth surface ; and horizontally lamellar all through. The turf of a forest-floor would also have its rootage striking downward into the soil beneath it. But this seam of coal is as clearly separated from the seam of clay below as from the seam of clay above ; and is like a three inch board of ebony, smooth above and below, placed between the two surfaces of clay. The lower seam of clay or marl is about five feet thick, and rests upon another seam of coal which is forty-two inches thick ; and this lower thicker seam of coal is as level on its upper and under surfaces as the three inch seam just described. And if a forest floor could possibly accumulate such thicknesses of pure vegetable matter at all, it would not be a level mass ; but must be irregular in thickness, and undulating on its surface ; the clusters of large trees with their large roots leaving greater mounds than the clusters of small trees. Neither of these seams, therefore, can possibly be the remains of vegetation which has grown there, and been submerged while it grew ; and how this vegetable mass was deposited there in that almost perfectly clean condition ; without having grown there ; is a mystery akin to that of the advent of the trees without their roots. We must and will solve this problem also." We have now proceeded about half way through this paper, and I will ask permission to conclude it in my next letter.

LETTER XI.

THE PASSAGE OF THE SUN'S RAYS INTO DISTANT SPACE.—METEOROLOGY AGAIN.—PASSAGE OF THE STARS' RAYS THROUGH SPACE TO THE EARTH.—A GREAT CARBONIFEROUS LAKE.—FISHES AND MUSSELS SUDDENLY BURIED IN MUD.—OCEANIC EROSION AND FORMATION OF PERMIAN AND TRIASSIC.—WONDERFUL PROVIDENCE IN THE NATURAL FORMATION OF COAL, IRONSTONE, AND FIRE-CLAY.—THE PROCESS REVEALED IN THESE RUINS OF AN ANCIENT FOREST.

2 AUGUST, 1891.



THANK you for the sight of Colonel Bolland's interesting letter of the 19th July. In saying that the sun is no more truly cool than it is truly dark, I remember adding that "it must, of course, hold enormous stores of heat not yet manifested." By which I meant what Colonel Bolland suggests, that the material of the sun is not, of course, all in a state of combustion. Its reserve of comparatively cool material must be enormous. There is reason to believe that the central inactive cooler portion of the sun is exceedingly dense ; and, therefore, a very great quantity. As to the return of all the sun's radiance to itself, I cannot conceive it. A portion of that which strikes the planets, may, as Colonel Bolland suggests, return as so-called positive, or attractive, electricity. But it must be a very small portion indeed. And inasmuch as the radiance rushes on through space until it meets something *to impinge against*, I cannot conceive how it can return if it meet nothing. We know that the radiance rushes on past the nearer planets, past the earth, onward to Saturn, Uranus, and Neptune ; and why not past Neptune also, right beyond the solar bounds, to "Sirius and Vega, Arcturus, Capella, and Aldebaran," even as some of the rays thence reach us, and therefore penetrate space in all their respective radii, if I may so use the word ?

Being myself a Fellow of the Royal Meteorological Society I am anxious to claim all the possibilities that I may for meteorology ; and am always ready "to take its part," and am as hopeful as my reason will permit for its utility and future progress : but I cannot expect that we shall ever be able to forecast the exact localities and forces of those eruptions from the solar Red Sea which will affect the temperature of this planet, and so forecast all the terrestrial meteorological results of such variations of temperature as arise from the difference between a calm solar Red Sea, and the states of eruptivity which produce fire-spouts ranging from 100 miles to 100,000 miles in height.

As to the earth's motion round the sun, I cannot myself conceive the radiant force producing the axial revolution by impingement against the crags, without, at the same time, *with the same push*, causing the unresisting orb to take the orbital course.

To return again to the question of the return of the sun's light to the sun : I just now referred to the light of the other suns—Sirius

and his fraternity of Satraps—travelling through space to this very earth of ours. The distance of these so-called fixed stars, or suns, is so inconceivably great that the light in question takes hundreds of years to reach us. And yet it *has* reached us, proving that it has not returned to its sources. When we find that it has travelled so inconceivably far from its sources, it is equally inconceivable that its destiny is ever to return.

Our own sun is a long way off—about ninety-two and one third millions of miles—and his light takes 8 minutes and 18 seconds to reach the earth. Consider—but it is impossible!—how far off must be those star-suns whose light positively takes hundreds of years to reach the earth; so that the suns themselves might have been extinguished hundreds of years ago, and we still seem to see them, because their unreturning light is still streaming through Space towards us, and as far on the other side, and above and below, in a seemingly infinite globe of radiance. That which touches the nearest point of convexity of the earth and the other cold orbs, is reflected and radiated back but will never reach its sources in these cases, as they will have departed first; what becomes of that which makes for the other suns we know not; but the rest doubtless still passes on farther and farther, at the rate of between eleven and twelve millions of miles a minute. I think we shall be obliged to adopt the idea of ultimate *infinite diffusion* of that light and heat, which now appear to be streaming from suns *infinite in number*. I am glad Colonel Bolland has raised this question, because it has led to this examination of it.

It seems to be a pretty general human idea that our “In the beginning” must have been the beginning of all material creation—of the lighted-up universe. But the probability is that astral systems had flourished, fulfilled their destinies, and expired, before ours was even kindled. We may judge that suns grow old, exhausted, and die, even from what has actually been witnessed by astounded astronomers. So-called fixed stars—the suns of distant systems—which have been noted and watched of old, have gone out altogether! The continuation of my work “On the Discovery of the Petrified Ruins of an Ancient Forest,” is this:

“We now visit another part of this marl-pit, which has been excavated much deeper than the three inch and the forty-two inch coal seams, and we examine a good section of the strata above and below

them, and the whole shews lines and bands of stratification indicative of sedimentary deposition—coal and clay alike. There are sectional bands of sedimentary clays varying from five inches to fourteen feet in depth, each in itself uniform in its sedimentary character, yet each differing from the others, either in its mechanical or chemical condition ; some of a more limy nature, some more plastic with alumina, some more sandy, some containing more oxide of iron than the others ; each therefore representing a separate period of deposition of a sediment derived each from a different soil by some great flood ; proceeding, perhaps, in each instance from a different point of the compass. We see at a glance that the whole is a series of sedimentary deposits in some deep water—the clay below the coal, the clay above the coal, the clay between the coal, and, presumably from the similar evenness of deposition and separation, and perfectly lamellar correspondence—the coal-seams also. So now the splendid Vision of the Carboniferous landscape shifts like a mirage of Paradise from this spot and settles upon plains and hills and crags above—which have since been removed by sea action—forming in every direction a magnificent horizon around a great lake on the bottom of which we stand. That this lake was once of great depth we know from the thickness of its successive sedimentary deposits, and also that it has been considerably shallowed by these accumulated deposits from its intermittently muddy waters. This lake, of which this particular basin was six miles in diameter, was inhabited by several genera of curious fishes, some of them about twelve inches long ; and at its shallow margin there flourished several species of the mussel kind, or Anthracosia. In the same way that the fragments of vegetation were buried in the mud in their living fresh crispness, so some of these fishes were so suddenly overwhelmed with mud that they were buried and moulded alive, and have left us their exact impressions to this day. So with the bivalves ; they closed their shells tightly when they were overwhelmed, and have remained sealed to this day. Now let us consider how these trees and this coal came here, and more fully describe the lake in which they were deposited.

"The landscape which we have glanced at in imagination—but which certainly existed in the ages of the coal-forests—occupied much higher ground than that on which we are standing in this pit, or ancient lake-bottom. The lake was very extensive ; how extensive

we can never know, because an unknown portion of its outer limits has been worn away by oceanic action during its submersion later on ; and afterwards again during its gradual re-emersion. And, besides, that Carboniferous horizon is now abruptly cut off at the north west by the great land-crack which I have spoken of as running northward into Cheshire. To search for that down-slipped western continuation of this coal-field or lake-bottom would probably necessitate a shaft from 1,500 to 2,000 feet in depth, and then the result would be very doubtful, as the fracture may have been very compound below ; or may have happened near the extreme denuded edge of the field after all. On the other hand it is just possible that the coal-fields may stretch right away at less than the depth mentioned, westward and north-westward under the whole extent of the Cheshire Plain, in a series of patches, or filled-up lake-basins. But of these sedimentary deposits which formed the great lake-bottom we have tracts preserved and exposed, which extend from Congleton Edge northwards to beyond Longton southwards, a length of about fifteen miles ; and the breadth from west to east of these patches, from the Potteries Field to the Cheadle and Ipstones Fields, is about sixteen miles. The original mean diameter of this lake was therefore certainly greater than sixteen miles ; and it is probable that near where Bagnall now stands, and also just south of Cheddleton, with the basin of Wetley and Shafferlong between, there were beautiful islets rising from the bosom of the waters. But during the oceanic erosion, of which I have spoken, these islets were ground away, leaving their elevated foundations of Yoredale sandstones now bare. And when the eroded land sank deep enough to be out of the reach of the surfacial disturbances of the ocean, it received on its worn surface, still slightly uneven, the results of the wear and tear of other tracts of red sandstone, which had been uplifted round about near to the surface of the sea and subjected in their turn to the action of the waves ; and this new deposit became a new marine formation called the Permian ; upon which were also deposited strata called the Triassic. But in the course of unknown time the same tract was again gradually uplifted within the influence of denuding wave-action, and once more became subjected to the mighty abrasive force of storm and tide sweeping over it ; during which period those Triassic and Permian formations were stripped off also in their turn, and re-

deposited in new depths still beneath the sea at this time ; and in lesser depths which are now above the sea on the plain of Cheshire. We know all this because original patches of the Trias and Permian remain to this day, as witnesses ; levelled off, in the hollows of the old Carboniferous sub-oceanic horizon. And not only were the Triassic and Permian strata stripped off, but the abrasive force continued long enough to work further into the more prominent remaining features of the old coal-strata, limiting the final area of the lake deposits to these fifteen or sixteen miles of diameter.

" Now while this further and latest marine abrasion of the coal-strata was going on, the coal itself was being wasted to some extent, so far as we know ; for the denudation went so far as to reach the bands of coal cropping upward like the edges of so many basins nested into one another ; with seams of clay and ironstone between ; which edges were crumbled away to some extent. The fragments of coal thus crumbled away from the western portion of the coal-field were cast down to the lower level of the Cheshire Plain, then seabottom ; with the other detritus of the higher country ; and a stratum of this crumbled coal may be found buried beneath the sand, extending largely if not entirely over that plain. To some minds this may appear to have been a wasteful and purposeless operation of nature ; and add strength to a doubt whether the creation and storage of coal in the earth had any prospective connection with the advent of man, who has since found it so peculiarly adapted to his genius and his wants, and has happened to utilize it so marvellously. I do not hesitate to confess my conviction, which I confessed elsewhere when writing of the coal-strata near Congleton Edge, that ' it is now gradually revealing itself to the intelligence of man, that the Plan of Creation of which he catches glimpses now and then through the researches of the naturalist, was a plan of uniform progressive beneficence in favour of many orders and races of beings ; but that this special work of the Carboniferous Period—the deposition of these strata of coal, clay, and ironstone, which fill the grit basins before us among these hills, was an express provision in favour of man only, for the exercise of his peculiar genius, and the fulfilment of his peculiar destiny, in conjunction with his control of Promethean Fire.'

" Now had this formation remained buried beneath the Triassic and Permian sandstones it would never have been known to man.

And had it not been for this abrasion of the edges of the strata, which, while it spread some waste fragments over the sea-bottom, left revealed at the very surface of the earth the edges of the bands of coal, clay, and ironstone, man would not only never have known of their existence, but, even had he known, he could never have reached them ; although furnished as he was with the genius and the fire to operate upon them ; for he needed them immediately at hand especially the ironstone and the fire-clay, for the manufacture of his first tools and engines. And let it be remembered that even these great formations of Permian and Triassic strata did their necessary work in the completion of coal before they were in due time removed. They acted as enormous presses to solidify the Carboniferous strata into hard compact layers, and shut down firmly for centuries the otherwise fugitive elements of coal, until man appeared and found it crystallized and ready for his use. However, every man must think as he will ; and some will persist in regarding all the progressive fashioning of the earth and its contents as the result of a series of natural accidents ; including the events which led to the creation and preservation of coal, for man to find and use. They will regard as natural accidents the creative events which have led to the order and progress of all things, from the marvellous life and orderly movements of the ants in their little cities, to the marvellous existence and orderly movements of the infinite systems of the stars in their courses. Yet wonderful indeed, and beneficent, are the accidents, if accidents they be, which have left us these rich filled-up basins as we find them ; with coal to give us heat and nocturnal light ; with fire-clay to build furnaces ; and with iron-ore to smelt therein ; all layer upon layer, including this marl-pit, in which we may read as in a book the orderly progress of the storing up of these things. So wonderful are these events as the result of Natural Accident, that we may reasonably exalt that expression, if we adopt it, in this case, to the same sublime meaning as Creative God, and Infinite Goodness !

“ After all we have in splendid reality round about us this fifteen or sixteen miles diameter of the great lake’s sediments of which the contents of this marl-pit form part. The contour of the lake-bottom was, of course, from time to time varied, because, like the land around it, it was often disturbed by subterranean forces. But the tendency of the more ponderous sedimentary matters was to slide down into

the hollows and so gradually restore its even levelness. This has been accomplished on the spot where we stand, and the lines of deposition are all nearly parallel, although the whole mass has been subsequently tilted to an angle of $12\frac{1}{2}^{\circ}$.

" Now besides such great depressions as this coal-basin of North Staffordshire, there must have been in every direction around on the uneven forest-land lesser lakes nestling, and streams flowing ; and when the land became intermittently tilted by upheaval, the lakes would be naturally spilt out of their basins, and the streams would be diverted from their channels, and rush over the land with the inevitable result of felling and stripping the light forest growth. The hollow stems would be snapped off at the first onset within a few feet of their stronger bases ; and then the stronger bases, partly rid of the binding soil, would yield to the continued pressure of the flood, and be torn from their roots. Or sometimes, when strong enough, they would longer resist the flood until the soil was washed entirely, or nearly entirely, from the roots, and then the base and roots would be hurried away together, either with or without the tender cord-like rootlets which are the feeders of the roots. Such stems of *Sigillariæ* with their Stigmarian roots attached, both with and without rootlets, have been found in other places, but not in this pit, and we have now only to consider the stems which have left their roots behind. Some of them, they being open at the top, would in their pell-mell transit over the ground scoop into themselves the muddy soil mingled with the fresh floral débris of the forest floor, sometimes telescoping smaller trunks, and sometimes including in their capture a lost lizard, a group of millepedes, or a land snail. The condition of the fossil ferns, grasses, and other vegetation in the interior of these petrified trees proves this scooping up process instead of slow sedimentary deposition. Whenever similar vegetable fragments are found in the surrounding strata they are spread out flat on the exact plane of the stratum. In some places they are so abundant, and still so level, that they are like ferns and grasses carefully spread out and pressed between the leaves of a book ; the leaves being of marl instead of paper. This is the result of quiet perpendicular sedimentary deposition. But, on the contrary, the vegetation mixed in the sandstone and marl in the lower part of these trees is so jumbled together at all angles, that it is difficult to secure therefrom a perfect spread-out frond ; although the

general perfection of structure and sharpness of detail prove that they are not the impressions of withered vegetation, but sudden impressions of living foliage and grasses overwhelmed in their fresh green crisp life, and so imprisoned in that tree-trunk. All this mingled forest ruin, with these mud-laden tree-stems, would naturally be carried onward, until the impelling flood bearing it reached the level of the great lake, on the surface of which the vegetation would float, carried still onward for awhile by the impetus of the current, and would then for days be tossed about and gradually washed comparatively clean before it sank. But these mud-laden Seal-stem trunks, comparatively few among the fallen hosts of the forest, being open at the top and closed at the broad bottom, and partly filled with heavy soil, when they reached the deep lake would naturally sink with the broadest and heaviest end downward ; while the upper open end, being light and floatable bark, would as naturally strain upward, and help to preserve the perpendicularity of the stem when the broad and weighted base reached the level bottom of the lake, and rested thereon, and sank into the soft clay. For besides the extra weight of the extra diameter of the stem's base, the gravity was increased by the greater thickness of the cylinder at that end, as now testified by the carbonized remains ; and all that part of the tree would be already water-logged, or saturated with water, and sinkable, through its special relation to the upper tree as its sap-bearer. The least extra tendency to sink first at that end would cause all the mud contained in the stem, being moveable ballast, to move in that direction, and accelerate the perpendicularity of the downward plunge. This operation and result may be artificially verified in miniature by means of pieces of bamboo flanged and weighted at one end and partly filled with mud and thrust into deep water. Of course such a result could only prevail where the trunk was hollow, and open at the lighter end, and closed at the heavier end, and that was just the condition of every one of these trunks under examination, *and these only do we find in this upright position.* The trunks of the same trees when broken off above the base, and therefore open at the lower end, would float on the water horizontally, with the other floating vegetation ; and when, in the course of time, the whole became water-logged, they would sink in their horizontal position, and be pressed flat, as we find them in the coal, like two ornamented boards pressed back to back.

They are numerous in the coal-seams and are sometimes found like solitary planks pressed between the strata of marl. If these tree-trunks had grown here, and were found upright because they grew here, forgetting for a moment the total absence of their roots, then we ought also to find the stems of other genera of the same forest standing in their native uprightness among these Seal-stems ; and also, as I have said, the stubby stems of the humbler ferns, grasses, and other plants ; for we have evidence from the débris spread about that the trees of the forest were a mixed community. We ought to find upright stems of calamites, lepidodendra, and tree-ferns. We do not find them so because their structure did not permit of their perpendicular sinkage, and perpendicular settlement upon the lake bottom ; and although we find many specimens of the hollow calamite filled with mud and sand, similar to the contents of the Seal-stems, and doubtless scooped up during the same flood-impelled passage, they are invariably prostrate, if not embedded in the Seal-stems, because they had not broad bases to rest upon like the latter. It is clear also that these trunks sank soon after reaching the deep water. The four-and-a-half-inch seam of clay on to which they sank is, as I have said, exceedingly fine, while that beneath it is coarse and sandy. When the preceding flood rendered the lake muddy, the heavier material would naturally subside first, and continue to subside, until the waters had become perfectly calm, and then the light fine aluminous clay only, remained in suspension in the very last stage of the lake's turbidity. That cloudiness in its turn very gradually subsided and constituted this $4\frac{1}{2}$ inch seam. Now the bases of these Seal-stems rest immediately upon and in this $4\frac{1}{2}$ inch seam. The four flanges of the bases as a rule do not quite penetrate the clay so as to reach the coal beneath, but in the instance of the largest of these trunks—that measuring near 19 feet in height—the projections of the flanges just reached the surface of the coal, which would be due to the greater weight of this trunk ; but even this did not penetrate the coal. As there is nothing but the fine clay immediately beneath these trunk-bases it is clear that they sank down before a single layer of the gritty marl which came with them and muddied the lake, had time to subside. Afterwards that marl was deposited upon the fine seam and around the tree-trunks ; and their interment immediately commenced ; and successive floods brought successive deposits of a

similar character, constituting the marl-strata ; but no more bases of Seal-stem trees, until in forming a thickness of about 20 feet they covered up and buried to this day the tallest of these fragments which we have yet discovered in this locality.

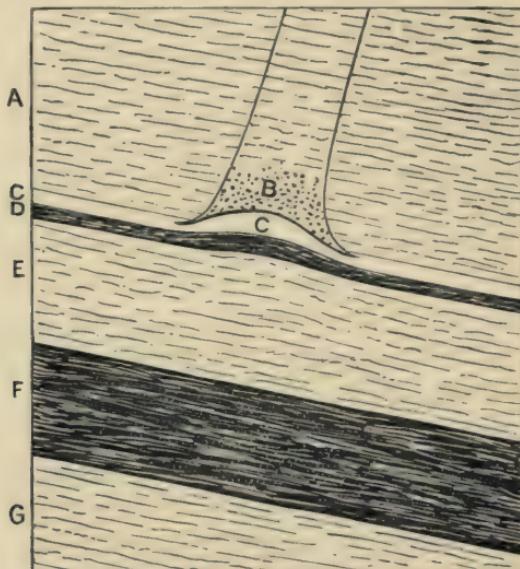
" It is, perhaps, worthy of notice that the scooped-up contents of the lower parts of these trunks are not strictly uniform. Some contain gritty marl, others fine sand which has since become hardened to a fine sandstone by the crystallization of a slight solution of silica which it originally contained. This solution of silica was derived from the decomposition of the clay-producing felspars of the granitic rocks ; and was abundant in the moisture of all primitive lands ; hence the hard cementation of the early mudstones and sandstones. Later on the siliceous moisture of the lands became greatly diluted in the general waters of the ocean, and the supply declined. It has been customary to regard the blue marls or fire-clays as the true Carboniferous forest-soil ; but the original soil was generally more sandy than the average marl ; the latter being separated from the sand in the sedimentary deposition of the whole in water. The admixture of all the sandstones, gritstones, marls, and shales, of the coal-measures would produce a fair sample of the coal-plants' soil. The contents of these trunks shew the soil around this lake to have varied from patches of plastic mud to patches of sand.

" Now this twenty-feet section with its embedded trees furnishes the means to correct a very general error in geological science. It has been the opinion of geologists that 'the *sigillaria* must have been a tree that could not long withstand maceration.' These are the exact words of the learned and eloquent Archibald Geikie in his 'Story of a Boulder.' It has also been declared an axiom that the deposition of the strata of the Coal-measures was a very slow process, and their accumulation at the rate of one yard per one thousand years is considered a very moderate estimate indeed ; for others shew convincingly, by means of faultless arithmetic, that even a period of four thousand and six hundred years is a very moderate estimate of the time necessary for the accumulation of one yard of the deposits of the Coal period. Here we have fragments of the *Sigillaria* trunk with 18 and 19 feet of measurable height before us, which have maintained their cylindrical and erect substantiality, and even their bark decorations uneffaced, during the accumulation of the same height of

sedimentary strata around and within them ; which should take, according to the chronological axiom referred to, more than six thousand years, or even twenty-eight thousand years, to accumulate. And this, too, has all happened since the trunks lost their Stigmarian roots and source of life, and became dead wood. A careful study of the remains of these Sigillarian trees has led me to the conclusion that they were—contrary to the opinion of Dr. Geikie—not such as ‘could not long withstand maceration,’ but were of the hard siliceous character of the bamboo ; which could not, however, withstand maceration for twenty-eight thousand years, nor six thousand years ; nor, perhaps, even six score of years, exposed in tropical water ; and a careful study of the strata of the Coal-measures has led me to the conclusion that their deposition and the deposition of most of the strata of the earth, was by no means so slow an operation as some scientists think. I shall, I trust, in another work on the Silurian deposits, shew the fallacy, and the origin of the fallacy, of the calculation which has led to this chronological error ; generally received as an axiom. It should be remembered that the prolonged preservation of solid oak-trees in a bog of cool temperature, the stagnant moisture of which is saturated with the preservative tannin of the oak-bark, is no parallel case to that of such a hollow bamboo as the *Sigillaria*, in open deep water beneath the warm sky, which rendered possible the luxuriant growth of the forests of the Coal period, and without the preservative tannin.

“ I have said that there is an exception to the otherwise uniform levelness of the clay and coal seams on which the Seal-stems rest, and that curious exception I must now describe. It will be seen by the accompanying section of one of the fossil trunks and its foundations, that the clay C and the coal D immediately under it form a hump, and are, just there, of a considerably greater thickness than outside the flangs of the tree-base. Even the upper surface of the 5 feet seam of marl E, is, in a slighter degree, similarly affected immediately beneath every one of these trunks. It is interesting and not difficult to trace the cause. When the stem descended into the lake the bottom was not domed as we now find it, but would be crowded, where the dome now rises, with a saturated spongy mass of sap-vessels capable of considerable subsequent compression. We find the ruins of this structure in the interior, preserved in the sandstone or marl. As the

sedimentary strata accumulated outside, the vertical pressure upon the surface of the soft seam **C** and its sub-strata, would be greater than the vertical pressure inside the stem, and would act as a lateral pressure under the flanges of the tree-base, and force the soft clay **C** and the soft vegetable coal-matter **D** upward under the tree, in obedience to hydrostatic and mechanical laws, until the whole became solid, as we now find it. In some cases the clay has burst upward through the bottom into the lowest interior of the trunk, and presses against the sandy marl **B**.



- A** Sedimentary marl.
- B** Sandy marl inside trunk resting on Carbonized bottom
- C** Four-and-a-half inch seam and hump of very fine clay.
- D** Three inch seam of coal.
- E** Five feet seam of sedimentary marl.
- F** Forty-two inch seam of coal.
- G** Sedimentary marl.

"Now if any reader feel that I am tediously minute in describing the details of these strata and their embedded fossils, and in applying thereto simple natural laws, and deducting therefrom the evidences of past natural operations exhibited in this pit, let him pardon me when he remembers that these carboniferous rocks and their fossils record a fresh paragraph, or a new reading of a paragraph, of the

natural history of our world ; and, to shew it to be a paragraph of real history, and not of mere geologic romance, it is necessary to examine these vestiges of the earth's remote antiquity with the keenest observation, and to apply to them the known natural laws to which they must have been subjected, and so to fortify the common-sense conclusions arrived at, with inexorable logic.

" To enable me to make this examination the proprietors, who are themselves men of science, kindly gave me permission and facilities to make unlimited personal researches in their pit ; to dig into its vestiges of the natural history of Creation, and to pull down and break to pieces these venerable tree-trunks—' felling their timber ' they called it—that these fossils might yield their secrets. And, behold, these are the secrets they yield ! "

[P.S.—In the foregoing paper I have observed that although in this Eastwood pit no example of *Sigillaria* had been found with the Stigmariæ roots attached, yet such had been found in other places ; clearly proving the universal connection between root and trunk ; but never proving growth *in situ* where the marl upon which the root rested shewed undisturbed sedimentary lines ; and the rootlets were not there. It is curious that while I have been looking through this MS., finally preparing it for the printer, I have received a communication dated October 16, 1894, from my friend Mr. William Hampton F.C.S., one of the proprietors of the said pit, stating that they have at last disinterred a *Sigillaria* with roots attached ; the very first discovered there ; and inviting me to see it before its removal. I have consequently been and examined the interesting thing. The horizon of fine marl on which it rests is about twelve feet above that of the Petrified Forest described in the foregoing paper. This fine marl is necessarily the deposit from turbid waters at rest, after an invading flood ; and after the deposition of the coarser burden of the invading flood. At length the peace of the lake is again disturbed ; and this little tree-fragment is to us the herald of the storm which has commenced. It has been torn up by the flood with its roots, but without its rootlets, and carried along, scooping up heavy matter as it went, into its hollow interior ; and entering the great lake it has sunk, with its heavier broader base downward ; and so, like the others, has alighted in an upright position. Around it and within it has fallen, almost simultaneously with it, a heavy shower of sand in which it has

become embedded. It is a small specimen, and probably a young one, whose lateral roots had not extended very far, and were easily denuded ; and, the main trunk having previously been snapped off, the rest was readily washed away from its native soil, except its cord-like rootlets. It would be quite as correct to call it a Stigmaria as a Sigillaria ; there being very little of the Sigillarian trunk attached to the roots. These latter consist of eight bifurcating radiations, projecting about two feet, or a little more, from the axis. The mean diameter of the trunk, above the flanging base, is about twenty-five inches ; and the total diameter of axis and roots is therefore from six to six-and-a-half feet.]

LETTER XII.

FAITH CLINGING TO ERROR.—THE FORMATION OF CHALK.—ORIGIN OF FLINTS.—EXAMINATION OF CHALK AT GRAVESEND.—ORIGIN OF MOUNTAIN LIMESTONE AND ITS SEAMS OF CHERT.—EARLY SILICEOUS STREAMS.

16 AUGUST, 1891.



OUR mention of God as "The Eternal '*Now*'—no before no after," is magnificent. It is not every mind, however intelligent, that can grasp the thought. It is a sublime paraphrase of the expression, To Him a thousand years are as a day, and a day as a thousand years.

I am very pleased to hear that you do not grow weary of the work which you have set me to do. I think I have already remarked to you that the errors of the wise and learned, being made so plausible by their wisdom and learning as to pass for truth, can only be discredited by unanswerable demonstration ; and that can only be done by full and ample exposition of many sides. And, even then, these errors in science are not removed all at once. Like errors and absurdities in religious faiths, they linger on, hugged and petted as truths by a mere faith which is blind to all shewing, and is unassailable by any logic. I think I mentioned to you before an instance of this clinging, even to the mere ruins of an exploded error, at Ashton-under-Lyme, where I had occasion to stay for a few days a few years ago, and found a lot of intelligent men wearing long

hair in token of their continued belief in Joanna Southcott.

And now, to resume the review of Mr. Laing's book, I have again to expose an error, for which he is not responsible; but which, like the others, he makes one of the foundation-stones of his consequently very unsubstantial fabric. I trust I have clearly shewn you that, coal not being "principally composed of fine spore dust," miraculously preserved from decay during *slow deposition*, there is no foundation whatever for the conclusion that "We have thus on a rough approximation, a *minimum* period of about 6,000,000 years for the accumulation of a single member of one of the separate formations into which the total 130,000 feet of measured strata are subdivided," namely, the Coal-measures. And I have now to shew that from a kindred fundamental error, the similar duration of time assigned to the Chalk formation on page 33 is just as fallacious as that assigned to the Coal formation.

On page 32 Mr. Laing says, and he is not responsible for it: "Chalk is almost entirely composed of the microscopic shells of minute organisms, such as now float in the upper strata of our great oceans, and by their subsidence, in the form of an impalpable shell-dust, accumulate what is called the 'Globigerina ooze' which is brought up by the soundings in the Atlantic and Pacific from great depths." "If one inch per century were the rate of accumulation of this microscopic shell-dust, subsiding slowly to depths of two or three miles over areas as large as Europe, it would take 1,200 years to form a foot of chalk, and 1,200,000 years to form 1,000 feet. Now there are places where the thickness of the Cretaceous formation, exposed by the edges of its upturned strata, exceeds 5,000 feet, so that this gives an approximation very similar to that furnished by the coal measures." But, O that "If"! In the same way that the fern spore-dust, when water-logged, was buried with all the rest of the forest wreck at the bottom of that lake which we have been examining, so "the microscopic shells" and also the shells not microscopic, which rolled down, were buried in the chalk when it was precipitated from the lime-saturated waters of Cretaceous seas in great white clouds of carbonate of lime. While the coal is too pure and black for the millions of years reckoned for its formation in the low-lying forests, swept as they were with the *dusty* winds, so the chalk is too pure and white for the millions of years claimed for its slow

deposition in those days of creation when the sea bottom and the dry land were so often broken up and overwhelmed and mixed with muddy, sandy, and pebbly ruin, such as we find on the top of the chalk. The same precipitation of carbonate of lime from the sea water to the sea bottom was happening in still more ancient days than the Cretaceous, at the very time when the coal-strata were being laid down in the inland lakes, the operation of which we have just been watching. The result of this earlier deposition or precipitation of lime from the waters of the sea is called the "Carboniferous lime-stone" because it is a member of the geological group of deposits laid down during, and immediately prior to, the Carboniferous Period, or Coal Period. The same formation is also called "Mountain limestone" because it is a great constituent of our mountain scenery. That formation also has been said to be almost entirely composed of microscopic shells : but it is not. It is chiefly composed of clouds of lime precipitated to the sea bottom direct from solution in the sea waters. The sea bottom was naturally the grave of all microscopic shells which sank into the calcareous mud. It became also the natural cemetery of larger shells, and of the stone lilies of the sea, and of fragments of various corals cast to the lower depths from the shallow places, and speedily covered up in all the sharp freshness of their beautiful sculpture with descending clouds of carbonate of lime. It was only by this rapid covering up in the calcareous mud that any of the shells, large or microscopic, and the broken stone lilies, and the corals, retained their distinct sharpness of beauty to this day ; for had they been exposed for the long periods claimed, in water not already saturated with lime, they must have been not merely defaced, but entirely dissolved, as it is the nature of all carbonate of lime to be, by water ; slowly if pure, and rapidly if containing carbonic acid, or any other acid, in excess of lime.

The deposition of chalk was accompanied with the deposition of flints, which are found embedded, generally, in successive strata, or layers, in the midst of the chalk. Some years prior to 1869 I commenced making notes for a book which I purposed to write "On the Constituents of English China, Earthenware, and other Ceramic Bodies," and flints being largely used in the manufacture of earthenware, they appealed to me to throw a light upon their history. They completely puzzled me, however, as I pondered over hundreds of tons of

them in great heaps, and carefully examined hundreds of individuals among them. Of course I knew what they were chemically, and whence they came ; but could make nothing of their origin, nor how they came to be where they were found. In 1869 I worked vigorously at my book, and went to various parts of the kingdom to study *in situ* the minerals under examination. But, before examining the flints *in situ* I went to the Jermyn St. School of Mines to gather there all I could of other people's conclusions respecting the origin of these mysterious nodules ; as the geological library there was more complete than my own at that time. After learning all I could there, which was very unsatisfactory, I proceeded to Gravesend to examine for myself ; and there I wrote the following section of the book, which, besides bearing on our present question of the origin of chalk, may amuse you with its sketches of the various theories of the origin of flints, which were created in the chalk :

" Flint, when entirely freed from its natural coating of chalk, is nearly pure silica, namely, ninety-eight per cent., with traces of iron, lime, alumina, carbon, and some water of crystallization. Silica as a base we have already glanced at in speaking of Felspar and Cornish China Stone. In the form of flints, however, it has a distinct history, and that history is at this moment an unread mystery.

" The great Pottery district is principally supplied (1869) with flints from the chalk quarries in Kent on the banks of the Thames, extending from Gravesend to Greenhithe. Those Works present a very interesting clean section of the secondary chalk, of about 100 feet in depth, with the flints exposed in lines. The quarries which I have inspected are those of Messrs. W. & T. N. Gladdish, Messrs. Henry and Edward Rosher, and Messrs. Knight and Bevan ; which include altogether a length of many thousands of feet of cliff. The overburden, or top soil, consists of a thin crust of loam and gravel, immediately beneath which, on the top of the chalk, lies a layer of large flints, many of them so large that an ordinarily strong man cannot lift one. This top layer is much impregnated with oxide of iron, evidently from contact with the ferruginous loam above, when in a state more susceptible of impregnation than at present. It is therefore useless in potting and is consumed in the neighbourhood in mending roads, and in building walls, and even good houses, which, with their carved stone facings present a pleasing appearance.

Beneath these large iron-stained flints immediately commences the clean chalk, throughout the whole of which are scattered flints of good quality, but generally smaller than the top layer. There are many thinner layers which continue like a pebble pavement for miles into the cliff, besides the stragglers scattered throughout the whole mass. And, especially, about 80 feet from the top occurs another conspicuous band of these nodules, resembling the upper layer in sizes and quantity ; but, of course, free from the oxide of iron. The whole depth of this chalk and flint deposit is estimated to average about 500 feet. The origin of these chalk flints, and their odd varying shapes, and their situation in the chalk, are enigmatical. Some theorists suppose they have been infiltrated in solution through the porous chalk, into cavities or bubbles in the chalk rock, and have there crystallized, presenting now the models of the forms of those hollows. In this case we should expect the siliceous solution to find no final arrest in the hollows, which would be as porous to let it out, as to let it in, until the porosity was stopped by the whole chalk mass becoming impregnated with silica, which would have changed it to a sort of chert, whereas we find the porosity and purity of the chalk complete, even almost immediately in contact with these nodules of flint. Another theory is that they have been formed by a small marine creature which has possessed the power of extracting from the water and secreting and surrounding itself with these masses of silica, in the same way that lime is secreted by others for the formation of shells. But this supposition appears utterly groundless since comparatively few nodules contain this little marine animal, and the shapes present no uniformity which such an origin would lead one to look for. Nor can we imagine how life, and activity of secretion, could continue after the tenant had once entirely enclosed itself in such flint-cased, solid, solitude, as to further enlarge the nodules on the exterior to their final sizes. It has also been supposed that these nodules were formed by congregations of infusoria, secreting silica shells ; and careful examination is said to have detected in the composition of flints the siliceous cases of these infusoria. But as such very careful examination is necessary for their detection, we cannot readily consider them the architects of flints, but only the very casual components of them, like many other strange things found buried in them. Another theory supposes them to be petrified sponges in which

all the original organic matter has been replaced by silica deposited from its solution, and the deposit continued until the whole had solidified. It is true there are some agates whose origin has been supposed to be of this nature, but the evidence is in the still visible cellular design and texture of these agates ; while flints never, to my knowledge, present such an appearance in their fracture. And, besides, in outward forms there is no resemblance whatever between a heap of flints, and a heap of sponges. Further, while I was pondering over this same theory in the great chalk quarries of Kent, and examining many flints which lay in collected heaps, I lighted upon some which contained embedded within them some beautiful specimens of the Echini, or Sea Urchins. The shells of these were not only enveloped in flint, but filled with it, and themselves had become changed into spar of a shining lamellar fracture. This thorough embedment would not have been probable in the body of a sponge. Some, again, have supposed them to be petrified bones of the vast Saurians which prevailed during the period of these chalk deposits, broken into fragments, and the fragments rolled about by river and wave influence to the further obliteration of their original forms ; also portions of branches of trees, and other organic objects. And, certainly, many flints present much the appearance of broken branches, and rolled broken bones of monsters. I was even shewn one flint at one of the quarries which I was told was a petrified lobster ; and another, nearly as large as a child's head, was said to have been an antediluvian periwinkle. But where among a million of nodules no two forms could be found alike, what might we not discover with the aid of a little fancy, except Etruscan vases and patera, and such conventional forms ? Therefore I attach no weight to the theory of petrified bones, branches, lobsters, and antediluvian periwinkles.

"A theory of Dr. William Buckland's is recorded in the Transactions of the Geological Society, vol iv. He says : ' Before the consolidation of the original compound fluid which is now hardened and separated into nodules of flint and beds of chalk, a variety of organic bodies being dispersed through its mass would afford a number of nuclei, to which, in separating itself from the chalk, the silex seems to have had a tendency to attach itself. Hence the insulated nodules that occur irregularly in the chalk, out of the line

of the flinty strata, do, I believe, very frequently bear traces of an organic nucleus. So also in many cases do those that occupy the flinty strata. But the greater number of these latter, though their forms be usually that of nodules separated from each other by an intervening portion of chalk, yet indicate no traces that refer them to organic origin, and are sometimes extended into thin continuous tabular masses.'

" Now this does not clearly reveal to the mind by what means the silica should 'in separating itself from the chalk,' or compound solution of lime and silica, find for itself independent space, and opportunity for collection into large masses without hindrance by the depositing body of solid chalk. For these nodules cannot be regarded as enlarging themselves by internal expansion from nuclei, and so causing the yet unhardened chalk to yield space like growing potatoes; but must have accumulated around nuclei, either imaginary or real, from without; which, if the deposition of lime were proceeding at the same time, would appear impossible, as the nuclei would become embedded in the chalk before the flints had developed around them. Yet this sketch of Dr. Buckland's may possibly be filled in to the satisfaction of the enquirer.

" In examining the general shapes of the flints and their appearance *in situ*, I could not resist the impression that their original condition was gelatinous. And this is not an extravagant suggestion, since the precipitations of silica in the laboratory assume the gelatinous condition. Confirmatory of this view there are several fine irregular horizontal lines of flints to be seen in these sections, which bear every appearance of having been compressed in a state of gelatinous softness, and flattened into thin tablets before there had been time sufficient for their development to the ordinary sizes. These flints, forming a thin line in section, extend many square miles into the chalk like buried pebble pavements. When their development was interrupted by the deposition of chalk they appear to have been soft enough to yield to the superincumbent weight, but not sufficiently soft to lose individuality by compression into one united flattened mass; for they still form distinct tablets of flint, or flattened nodules, with their irregular round edges. Another indication of original softness is the impregnation with oxide of iron of the topmost layer of flints beforementioned; the oxide of iron being absorbed from

the overlying stratum of loam.

" Now this compression of some of the thin strata of flints, and the general situation of the nodules in strata, appear to indicate that the precipitations of lime and silica were not simultaneous, but that there were periods of deposition and intervals of rest, the flints being deposited in so many gradually increasing gelatinous masses, by a mysterious attraction of aggregation, during intervals of cessation of deposition of the chalk.

" First we will suppose that the compound solution of lime and silica deposited its lime only, through its carbonic acid being saturated with the lime, the carbonic acid being very abundant in the waters of those days—deposited it as a carbonate—chalk being a carbonate of lime. Then the waters, still containing the silica in solution, deposited that, through some undiscovered process of nature, and formed gelatinous masses *on* the bed of lime. The secret of these apparently capricious forms we cannot explain ; but it was evidently the natural tendency of silica under such circumstances so to form itself ; in the same way that crystallizations generally, take place variously, but in fixed conformity to the natural habit of the substances under certain conditions, separating themselves into distinct detached masses from a compound solution, as here ; only in more systematic uniformity of shapes ; while here we have, instead, apparently systematic capriciousness of formation ; or what seems to us very much like it. It is a relief, after contemplating these formless masses, to discover beside them, embedded in the chalk, the numerous examples of the very beautiful fossil which somebody has called *Cidaris Sceptra*, like fairy sceptres of the deep. After a certain period of accumulation of these flints, the waters again become charged with a solution of lime, or rather, a fresh infusion of carbonic acid gas carries down another stratum of chalk, during which the formation of the flints ceases, until again the deposition of lime is suspended, and another layer of flints is formed during an interval. Now these periods appear to have varied considerably in duration, as indicated by the varying thicknesses of the strata of chalk, and the sizes of the flint nodules. A long cessation of lime deposit appears to have been favourable not only to an increased number, but to increased largeness of the flints, two such strata of which I have already alluded to ; while shorter periods probably produced those thin tabular

flints which I have also described.

"With this view of the origin of flints I dismiss the question and retrace my steps along the banks of the Thames. I note that at this moment the stocks of flints are very large, shewing the supply to be greater than the present demand (1869). I observe also, on leaving Messrs. Rosher's Works, very interesting evidences that the Thames was once a much wider river here than at present. The excavations into the chalk hills leave exposed a section of land river-ward of the chalk, extending some hundreds of feet from the present water edge, which indicates clearly in its section the sloping river deposit of pebbles, sand, earth, and detritus of the chalk formation, apparently the result of many centuries of river flow. Evidently the land has been gradually and uniformly raised, for the deposit slopes from the cliff tops, and was banked against their perpendicular sides. There is no sign of sudden Plutonic convulsion in this case, the strata presenting everywhere very level lines. The precipitous sides of these cliffs also, as shewn in the section where the river deposit banks against them, indicate a previous period when the flow was too rapid to allow of deposit from its waters ; but, instead, wore away its clear passage at the expense of the chalk.

"In proceeding to the chalk quarries from Gravesend Pier, or the Railway Station, a very extensive wall is passed on the Thames side enclosing Rosherville Gardens, entirely built of large fractured flints, which presents in its tens of thousands of specimens an ample study of every variety of chalk flints, and of the various embedded shells, pebbles, and other objects."

There is no doubt in my mind that each stratum of chalk in this formation was precipitated with rapidity ; with the rapidity of a great snow-storm ; and the Cretaceous sea must have washed coasts of limestone—possibly some of the old Carboniferous limestone, or calcareous formations older still ; and the abundant carbonic acid of those days impregnating the upper waters would make rapid work of the dissolution ; and then only saturation was needed to produce the sub-marine snow-storm of depositing chalk.

So far from the chalk strata appearing to be the result of so many millions of years of depositions, the whole series, from bottom to top has the appearance of comparative newness. I have referred to the Carboniferous limestone as an example of calcareous deposition earlier

than the Chalk or Cretaceous. It is much harder than the chalk and that seems to be because, during its greater age, there has been time for its permeation with a saturated aqueous solution of itself; which solution, since its upheaval above the sea, has crystallized, and added considerable hardness to its original earthy or porous state. So completely has this crystallization filled up the interstices in many places that the limestone has become a dark marble capable of beautiful polish; often exhibiting its coral and encrinital or sea-lily ruins in interesting profusion. Now when this Carboniferous limestone was being precipitated at the bottoms of Carboniferous seas, it also, like the chalk, had its intervals of depositions of silica; but instead of the silica separating itself completely from the lime, and forming itself into nodules of flint, it descended in mixed-up company with the cloud of chalk, and formed bands of chert, which is a material harder than flint itself, though only a combination of flint and lime. There appears to have been a disposition here also, on the part of the silica, to concentrate itself, and separate itself from the carbonate of lime; but there appears to have been no timely cessation of the deposition of the latter, to allow of that complete separation, and they were obliged to blend company when the silica was sufficiently concentrated for deposition. I am sure I have noted a third instance, or variation, of this precipitation of silica in connection with the precipitation of lime, but cannot at this moment remember what it is.

As to how this solution of silica came in such quantities into the ancient seas, and permeated also the early mud and sand, making them into mudstones and sandstones, like the rocks of Aberystwith, I think I have already hinted. It was liberated by the decomposition of the felspar of the granite, which decomposition furnished the earth with its original soils of growth. I have shewn fully in "Cloud Hill" how the hard felspar becoming decrystallized, parted with its potass, and with as much of its silica as that potass could carry away in solution, leaving the rest of the silica and the alumina as clay; and leaving the quartz of the granite as loose sand to mix with the clay and make a fruitful soil.

I think my next subject will be the alleged intense internal heat of the earth.

LETTER XIII

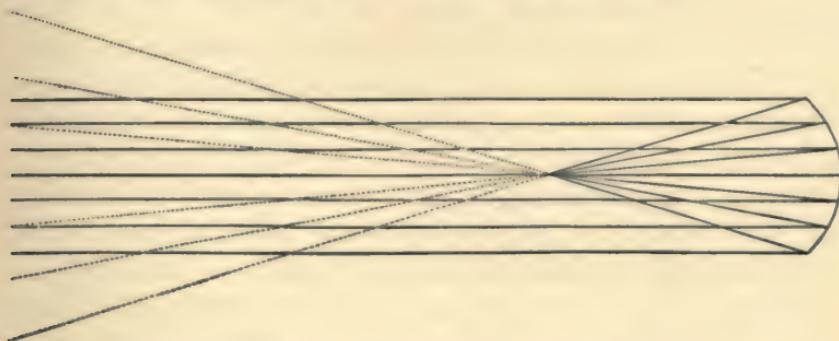
THE UNDIVERTED PASSAGE OF RADIANCE THROUGH RADIANCE.—THE PRIESTS OF BAAL AND THEIR SACRED FIRE.—INFINITE DIFFUSION OF LIGHT AND HEAT.—THE WISDOM OF KNOWLEDGE TO KNOW THAT WE KNOW LITTLE.—MAN'S CONSTANT IRRECOVERABLE LOSS OF THE METALS.—THE EVIDENT FINALITY OF ALL EXISTING CONDITIONS OF TERRESTRIAL THINGS.—LIFE A MERE PROGRESS OF BLESSING.—MYSTERIOUS DREAMS OF KNOWLEDGE.—DR. HUGGINS AT CARDIFF.—THE NEBULAR THEORY AGAIN.—SOME OF THE ELEMENTS OF STARS AND PLANETS EXAMINED TO SHEW RESULTS OF CONDENSATION FROM GLOWING VAPOUR.—THE SPECTROSCOPE ABUSED.—DARK SUNS.—THE GOAL OF STELLAR PROGRESS.—A CROWD OF NIGHT VISITORS.

30 AUGUST, 1891.

QHEN I say that the radiance of the sun undoubtedly rushes past the planets "right beyond the solar bounds to Sirius and Vega," without returning to the sun, just as the radiance of Sirius and Vega comes straight to us, or we should not see those stars, I refer to that immensely larger proportion of the sun's radiance which has not been actually arrested by the said planets. That portion of the light and heat which has dashed against the planets—the 227 millionth part of the whole—may be partly reflected back to the sun; and this brings in your question "If a lesser heat confronted a greater heat, would the greater absorb the lesser, or would the lesser pass on through the greater?"

As the radiance of light and heat, although a force, is not matter that we know of, at any rate in its condition of light and heat, I don't see how opposite radiances can possibly reflect or deflect or impede each other, or a greater absorb a lesser. In fact this radiance, whether of greater or lesser intensity, always moves on in a straight line until reflected or deflected or absorbed, by *matter*. If it were not so the light from the various stars which is radiating and intersecting in every possible direction, would never reach us, but get mixed up in utter confusion in space, all turned aside from its original course.

And we can prove the passage of radiance through radiance, unimpeded, on a small scale, by a very simple experiment :



In the above the horizontal lines represent radiance of heat, streaming from the left, and impinging against a polished metal concave reflector, from which the heat is reflected back at the angles indicated by the pencil-point of lines, and is concentrated in a focus at the extreme point. The concentrated heat of the focus, which is maintained all the time that the radiance streams from the left against the reflector, proves that the passage of the heat to the reflector is not impeded by the opposite current to the focus, and neither is the current to the focus impeded by the contrary original source of radiance. The streams pass through each other in straight lines, at any and every angle, and even in direct opposition, as shewn in the central line of the pencil of reflection. It was by means of such polished metal concave reflectors that the ancient priests of Baal, or the sun, obtained direct from their god the Sacred Fire.

You will perceive that the radiance streaming from the sun all around into space, and moving in straight lines, because, not being matter, it is not subject to the laws of attraction of gravitation to be drawn aside by the planets, passes on between them and their satellites, the great bulk of it, past them all, and ever on between and past the distant fixed stars, striking against those that be in its way, but ever still passing on where there is nothing to strike against, and absorb or reflect it.

As to the heat of the stars there can be no doubt that many of them give out vastly more than our own sun—Sirius for instance—but it does not reach us in any *sensible* degree, because of the immense distance of those great fires; and it is only the heat of the

sun that is of any use to us so far as we know. No doubt the heat of the stars reaches us in a degree insensible to us, because their light faintly reaches us—as a mere speck.

To the foregoing pen and ink illustration of the reflection of heat and light from a concave mirror, I have added faint dotted lines continuing the course of the rays in their divergence *from* the focus. You will see that some of them shoot out beyond the bounds within which they originally streamed to the reflector, while in the central line they stream direct back to the source. The reflection of that central line from the convex surface of a planet or satellite to the solar source would be just the same, and this illustrates what I said about the partial, but very trifling, return of the sun's radiance to itself. Beyond that we have not a particle of evidence or probability of the restoration to the sun of the sun's emission. But all that we know and all the probabilities that we can actually perceive point to the conclusion that the radiance of all the suns passes on and on, in a straight line, at an enormous speed, infinitely, into infinite space, the suns themselves appearing to be also infinite in numbers. And there is no reason to doubt that the light and heat itself, speaking of the divine thing as one, is itself indestructible and eternal ; and capable of infinite diffusion ; to which infinite diffusion it is tending, from local concentrations in the suns. The light passes on and on, as we see from the more and more distant stars that are revealed to us ; the proof of that onward and onward passage of light being that it actually reaches us from those awful distances ; becoming proof by arrival and presence. That which is reflected from its direct course from its source, by striking against other suns, and against planets and satellites, still moves on thence, reflected in straight lines, though divergent ; as we well know from our own moon ; and becomes, all but a fraction, utterly lost to its original course either directly onward, or back again.

There can be no doubt that, much as we seem to know of the outer universe, we know very little indeed about it, and have much to learn ; and then there will remain much more that we can never learn until we are emancipated from the trammels of this life. It is this want of knowledge which renders us so incompetent to construct trustworthy theories—untrustworthy when they have no foundation, no facts whatever to support them. In proclaiming that the sun's

radiance is a mighty cosmic repellent force I utter no dogma. It is evinced by Mr. Crookes' Ray-Mill, and by the manner in which that force repels the approach of the comets, overcoming the attraction of gravitation and cometary push combined, and hurling those wanderers back from perihelion into space. The more that we have of the wisdom to know that we know so little, the less shall we be disposed to venture on astronomical theories.

The great Newton, seeking for future supplies of solar food, which he saw would be necessary for ever, to keep the sun alive for ever, theorized that the comets must furnish the supplies. He then had to theorize that the impact of one of them must cause the vaporization of the planets. But the impact did not take place, and the planets have not become nebulous.

I have already dwelt upon the general assured mortality, or change of condition, of all terrestrial things. The earth's coal is exhaustible, and so is its metallic iron, and so are all its metals except gold ; and that is very greatly reducible in bulk. We gild our habitations on the sea and on the land ; and thousands of things, every day ; from which the gold never returns to bulk, but is scattered and lost to us beyond recovery. Silver we lose by constant sulphidation, and all the other metals by inevitable oxidation. The iron, which appears so indispensable to us, unites rapidly with oxygen and sprinkles itself all over the earth in *irrecoverable dust* of rust. It seems that the supplies of iron and coal may fail at about the same time. It is thought that we shall then find a substitute for coal in electricity. But there is not enough copper in all the world to supply the need of England alone in such a case ; apart from the question of its natural gradual waste. I have also referred to the fact that a limited earth cannot contain an unlimited population ; and the day must come when something final will happen in that direction. With this finality of existing terrestrial things so evident, is it unreasonable to suppose that the Omnipotent should provide a finite and mortal sun, to light up a finite and mortal scene and state of things ? Would it not rather shew Divine Wisdom and Purpose to light a candle which would burn as long as ever needed, and no longer ? When the sensific heat and light are no longer needed for beings of sensitive flesh, we may depend upon it they will be succeeded by the spiritual light and heat that shall be immortal in eternity ; and that may very possibly be the same light

and heat of the infinite suns, in infinite diffusion ; as I have hinted before. That this Diffusion is taking place is no dogma or theory. Every star that shines in the heavens bears witness to it, by revealing its own diffused and diffusing light to us. And all the events of provision and exhaustion, or change, that happen and that will yet happen, in the fulfilment of the destinies of perishable, or changing things, we may rest assured are indeed circles of blessing, and runcles of the ladder of progress to higher and higher perfection and happiness ; including the earthly birth and the earthly death of man ; the equally happy beginning and close of a chapter of blessing ; whatever may have been the trials and sorrows included therein.

As to the mysteries of creation—mysteries because of our want of knowledge to understand them. I have often a curious experience during sleep, and have had the same from boyhood. I fancy that your own constant meditations on sublime and profound things, must have led to a similar experience ; and that it may be familiar to all who study nature deeply and strive after more and more knowledge of her mysteries. In a sort of dream I seem to have completely unravelled things previously tangled, and to have got new clear views of things previously impenetrable. While rejoicing in these discoveries, and wondering how things, now so simple, were before hidden ; and while still rejoicing even in the act of awaking, and thinking to drag the new knowledge with me, a door slams to, and all the light of new knowledge is shut out again, beyond the slightest recollection. Some night, very soon, I expect to be thus dreaming the solution of mysteries, with a clearness and grasp denied to the wakeful life of the material brain, with the door of the light of knowledge opened finally—never again to be closed by the awakening of the material brain with its narrow limits of comprehension ; then to burst from the trammels of this life like the butterfly stepping forth from its grub-life ; or, rather, its grub-sleep ; with its new power of flight high above all its old crawlings ; never again to awake from a forgotten dream of knowledge to the return of the actuality of ignorance. It was after such experiences that I wrote the twelfth and thirteenth stanzas of the “Morning” ode in “Jewitt,” in the morning of my life.

Of course in all that I have said of the earth’s progress in its stages of development, leading to the completion of its destiny as a human theatre, I have kept in mind the other members of the solar

system, and supposed that they too are each respectively fulfilling the destiny of its creation, whatever that may be. It is difficult to imagine that while the earth is so crowded with varied life, world within world, all animated by the radiance of the same sun, yet the same light burnishes the other planets all in vain.

Since writing the foregoing I have read the newspaper cutting which you kindly enclosed to me, with report of the opening address from the chair of the British Association at Cardiff. As this letter is already pretty far advanced I will ask permission to postpone the consideration of the internal heat of the earth until my next, and to devote the remainder of this to the subject of the newspaper cutting, especially as that subject belongs to the review of "Modern Science and Modern Thought."

It was because such eminent astronomers as Dr. Huggins, chairman of the meeting at Cardiff, hold to the theory of the nebulous origin of worlds, and their initial "glowing gas" condition, that I said of the author of the above work that he is not responsible for what he wrote on that subject. In stating my case against the nebular theory I believe I referred to the instance of the glowing gas resulting from the explosion of gunpowder, and the impossibility of its prolonging its glowing gaseousness indefinitely in the open cold air or colder space. That illustration alone ought to be sufficient to destroy the nebular theory of Laplace, supported by Dr. Huggins at the Cardiff meeting of the British Association. We cannot too clearly impress upon our minds that according to the laws of light, heat, and cold space, a cloud of glowing gas or vaporous matter can no more maintain itself indefinitely in that condition in open cold space, than the flash of a gun or the lighted gas of an exploded powder magazine can permanently float in the air in isolated glowing gaseous condition. In fact what is impossible in that way in the air, is still more impossible in colder rarer space, as we know from what we know of natural laws, and the swift passage of light and heat to us through that colder rarer space outside our atmosphere. Besides the physical impossibility of the nebulous origin of worlds, we, of course, see no sign whatever of such an origin in this, the only world in which we can seek such a sign. It is impossible to conceive the deposition and separation of the several bodies of a planetary system from such a mass. What sense is there in such words as "thrown off" to account for the in-

dividuality of the planets and satellites? If it were possible that worlds could be condensed or deposited or precipitated from a glowing mass of cooling gas, cooling so very very slowly, we should expect the globes thus condensed to be composed of orderly strata, if I may so use that word, of deposition; the separate elements condensing together in their natural separate rotation; and keeping company layer upon layer, like the layers of an onion. Let us try to make this clear for it is an important consideration. Let us take note of the behaviour of a few of the elements of worlds such as our own, under the operations of heating and cooling, both of which are included in the nebular theory. We need only glance at a few of the substances most familiar to us, say: Tin, bismuth, lead, zinc, copper, silver, gold, nickel, iron, and platinum. These substances all melt one after another in the rotation in which I have placed them; so that when tin was liquid all the rest would still be solid; and when tin and bismuth were melted, all the rest would still be solid; and so on until at last gold was liquid; and then the heat would have to be increased more than four and a half times before nickel would liquefy; then at a further increase of temperature iron would yield; and then platinum would still be a solid; but, finally, that would yield. Now it is the same with metals as with water: leaving out the question of oxides, their temperature-conditions are solid, liquid, and vapour or steam; and the vaporization of these liquids would happen at different times, as the melting did, but not exactly in the same time of rotation.

I have left out the question of the oxidation of the metals because the probability is that the oxygen would be wedded to the immense quantity of carbon as carbonic acid gas, and would not be at liberty to unite with the metals. But if it had been, the vaporization of the different substances would still be at different degrees of heat. Supposing now the whole to be in a state of vapour, for which we can see no reason or wise purpose; we have to *imagine* the gradual cooling. That element which requires the greatest amount of heat to keep it in vapour must, naturally, condense first, and that would be platinum. It must first become a ball of liquid and then of solid. Then, when the temperature was sufficiently further reduced, all the iron would be deposited from that nebulous cloud around the platinum; entirely enclosing the latter. Then would follow a casing of nickel; and then a pause. After an interval longer than any other

would come the shower of gold, gilding that ball, like a ball of fire within a cloud of fire ; and that gold, and nickel, and iron, and platinum, would be all lost and unknown to future man for ever. Then the gradual cooling and consolidation would produce the casing of silver, then of copper, then of zinc, then of lead, then of bismuth, then of tin. I have spoken only of familiar metals, and said nothing of potassium, sodium, and calcium, the bases of potash, soda, and lime ; which would encase all the rest. But supposing some of the metals to have been fully oxidized in the vaporization, the globe would have been finally encased in a covering of real glass ; for the latest to deposit from vapour would be the metals potassium, sodium, bismuth, and lead ; each of which when it is fully saturated with oxygen, becomes a vapour of glass ; with the power of an acid, both as vapour and liquid, to dissolve silica, and the oxides of calcium and aluminium, and convert them to glass which freezes into solidity among the latest of the nebulous deposits, if these things could be maintained in nebulosity. It may be suggested that we know nothing of the composition of the centre of the earth and that it may indeed be formed case within case as I have described. No : we have all these metals on the surface ; and the iron, which should encase only the platinum, and be encased itself within all the rest, we have very abundantly pervading the crust of the earth. Although we are losing it as a metal it is still with us as a scattered oxide. This result of nebular deposition in the creation of worlds would be too foolish even for human foolishness—thus to lock up, case within case, the elements of future organic structure, for all must have obeyed the same law—but the theory itself is not too foolish for the wise and learned of even this generation. But, behold, it is all a dream ; and I trust I have said enough to shew that there is neither top nor bottom to it. Opinions are not to be accepted as Gospel truth because they may have been uttered at a meeting of the British Association ; as I am sure you will have found out if you have watched some of their ventilations.

But yet one paragraph more on these mysterious nebulae. They are thought not to be clusters of suns like the Milky Way and other nebulous patches in the heavens, because their faint light, when sifted through the spectroscope, does not yield the various colours of the various constituents of glowing suns ; but yields only three tints, all greenish, one of which *might* represent hydrogen, another nitrogen,

and the third a gas altogether unknown. Now, should this be considered a reason why they *must* be the nebulous constituents of suns and planets, even because the constituents of suns and planets are *not* revealed in them by the spectroscope? I should have thought quite otherwise. And it is thought no objection to their being masses of glowing hydrogen, nitrogen, and one other gas, that they retain special fixed forms in distant space. Take the "Dumb-bell" nebula in the constellation Vulpecula for instance. Whenever it is observed it still retains the Dumb-bell or "Double-fluff-ball" shape. It takes a very powerful telescope to reveal the Dumb-bell as a cloudlet less than three quarters of an inch in its longest diameter; and that little patch is calculated to be *many millions* of times *greater* than the entire diameter of the orbit, or path round the sun, of our Neptune, which orbit of Neptune is more than five thousand millions of miles across. Surely it is placing too great a responsibility upon the spectroscope to leave it to decide in such a case! To suppose that such an enormous flare of hydrogen, nitrogen, and some other gas, should retain a double-fluff-ball shape for thousands of years, and continue to send us its light in that form, which light itself takes hundreds of years to travel to us, from that same constellation of Vulpecula; light all unfailing though mere ignited gas; and that those three gases should be embryo astral systems, is all about equally consistent, reasonable, and credible. If the spectroscope tell the truth, and the whole truth, in the three guessed gases of the nebula, it tells also, surely, that they are not sun and world-building materials at all, as we cannot possibly conceive any worlds and suns to be composed of only three such elements. And yet the spectroscope appears to be the only confirmor of this guess of Laplace; now pronounced by the chairman of the meeting of the British Association at Cardiff to be confirmed by the said spectroscope. The spectroscope may have told us the truth, but not the whole truth; and the whole truth may be that these nebulae are aggregations of complete systems of suns and planets too distant for complete analysis by the spectroscope.

At the same time Dr. Huggins said: "A recent remarkable photograph of the great nebula in Andromeda seems to show us a solar system actually in process of construction out of the original atoms. Though we do not know the distance of this nebular system, there is little doubt that it is very remote, and gigantic beyond our power

of comprehension. The photograph shows a sort of whirlpool disturbance of the luminous matter, in which a series of rings of bright matter, separated by dark spaces, surround a large undefined central mass. What," asked the president, "was the original state of things? How has it come about that, by the side of ageing worlds, we have nebulae in a relatively younger stage?" He has not the slightest ground for saying that we have nebulae in a relatively younger stage; although, of course, there *may* be new worlds in course of creation. He continues: "Have any of them received their birth from dark suns, which have collided into new life, and so belong to a second or later generation of the heavenly bodies?" Here we have another utterly baseless theory. By "dark suns" he means suns which have given out their light and become dark and dead; and he supposes regeneration by collision with one another. To my mind this is impossible. He continues: "During the short historic period, indeed, there is no record of such an event; still it would seem to be only through the collision of 'dark suns,' of which the number must be increasing, that it is possible for the heavens temporarily to renew their youth; only such ebbings and flowings of stellar life can delay, even for a little, the inevitable end to which evolution in its apparently uncompensated progress is carrying us." We have no evidence or sign of the renewal of individual youth in the heavens or of any individual anything under the heavens, and no reason to expect it. What could it be but retrogression? And he confesses that "only such ebbings and flowings of stellar life can delay, even for a little, the inevitable end to which evolution in its apparently uncompensated progress is carrying us" Then why should it be interfered with and delayed at all? The evolution and the uncompensated progress, being progress, why attempt to delay it in theory by inventing baseless theory? That all these changes are indeed progressive, and increasing blessings, we may rest assured. Why should we flinch from the thought of the death of suns and systems any more than from the thought of the death of ourselves? Well, it seems natural to do so, until one gets used to it, as I have got used to it. We believe that for ourselves Death is the Gate of Life, and the next life into which we shall enter we feel sure will be an improvement upon this. And why should not the ultimate failing of the sensific light and heat of the suns be equally succeeded by a more perfect universe,

illumined with that infinitely diffused eternal light, at which I think I must have already hinted, for it is always in my mind. The perforation of Dr. Huggins beautifully refers to this thought: "Since the time of Newton, our knowledge of the phenomena of Nature has wonderfully increased; but man asks, perhaps, more earnestly now than in his days, What is the ultimate reality behind the reality of the perceptions? Are they only the pebbles of the beach with which we have been playing? Does not the ocean of ultimate reality and truth lie beyond?"

Doubtless. But the pebbles of the beach are too vast for us. It is only the minutest grains of the sands of the beach of truth that we have been able to grasp and play with. I feel this "grain of sand" idea very forcibly wherever I go and wherever I look. I have to-day been watching the flowers in their so varied forms of beauty and divers virtues, and their incessant callers, the numerous families of winged insects. Every flower and every visitor is each an incomprehensible wonder in itself; and another wonder is that the visitors are dependent upon the flowers and the flowers upon their visitors for continuance of life; and both and all are dependent upon a distant star. And there is a wondrous vast deal more of startling truth all around me wherever I go and wherever I look; which I cannot grasp; without ever looking up to the stellar heavens. And now, while I am finishing this letter by the light of my lamp, the no less wonderful winged life of a summer night pours in at my open window, attracted by the flame; although the habitat of its wakefulness is the darkness. And I am again puzzled at the multiplicity of its structure and design, and to know why it all is, and the ultimate design of all this varied crowded animated creation; all so wonderfully provided for, according to varied need, from birth to death—that change which to these wonderfully made creatures also should surely mean progress, as well as the life and death of a star; if there be uniformity of evolution in creation. If not, why were they created? They have not their wonderful varied make and consciousness for nothing I am quite sure. They plague me a bit, and are constantly dabbling and sprawling on this sheet; but I bear with them as fellow creatures; "wanting to know," perhaps, something about my lamp and me. Thus the active life of the summer night is vast and varied, as well as the active life of the summer day.

LETTER XIV.

THEORY OF THE EARTH'S INTERNAL HEAT EXAMINED.—SCIENCE IS KNOWLEDGE OF TRUTH AND CORRECTION OF ERROR.—A GLOBE EIGHT FEET IN DIAMETER ENCLOSING INTENSE HEAT WITH A COOL EXTERIOR ONE EIGHTH OF AN INCH THICK.—ASTRONOMICAL CONTRADICTIONS.—MORE ABOUT DARK SUNS.—THE CAREER OF A SHOOTING STAR.—THE HEAVENLY WEDDING OF OXYGEN AND IRON.—NIGHT VISITORS AGAIN.—THE MARVELLOUS MECHANISM OF INSECT LIFE.

13 SEPTEMBER, 1891.

TURNING now to "Modern Science and Modern Thought" I pause at these words on page 37 : "This inward heat of the earth is not a mere theory, but an ascertained fact ; for as we descend from the surface in deep mines or borings, we find the temperature actually does increase at a rate which varies somewhat in different localities, but which averages about 1° Fahrenheit for every 60 feet of depth. At this rate of increase water would boil at a depth of 10,000 feet, and iron and all other metals be melted before we reached 100,000 feet." This is certainly modern thought, for which Mr. Laing is not responsible. Is it also modern science ? It is time I answered such a question. I have already objected to several theories such as this, for mere theory it is after all ; and I trust I have shewn them to be wrong. But I am sure I have not objected to a single sentence of science ; and could not possibly shew that to be wrong. Science is knowledge—knowledge of truth ; and it is also by it that we obtain knowledge of error, as error. It is impossible to prove science to be wrong. In exposing some erroneous theories I am not attacking science, but only making true and proper use of it to expose non-scientific error, by the aid and logic of science itself. It has been the custom age after age, and the custom of great and learned men too, to set up in the name of science—name only—certain theories, which are either mere guesses, or are reared upon foundations of error—blocks of ice instead of blocks of quartz for instance, and the authors often claim for them that they are axioms. But these theories come and go like blocks of ice, and like the mirages of the desert ; mirage

succeeding mirage. It is the light of science itself, the application of the logic of facts instead of fancies, that leads us from these pictures in the air to the real oases of truth. I remember a very learned scientist once putting it to me, and insisting upon it, that the above description of the temperature of the interior of the earth was not a theory but an axiom. This shows how with insufficient science, a man of science, a true traveller in the desert, may even mistake a mirage for a true oasis. Yet what am I saying about the mirage? That itself is scientific, and a natural result of certain facts, and a reflection of truth, while the human guesses of which we are speaking are just simply wild wilful guesses, and nothing else.

How anyone who believes in such a globe of internal fire can ever think of taking the trouble to build a house upon its land, or launch a ship upon its water, puzzles me. Look at a terrestrial globe, or map of the world; contemplate its seas and oceans which cover about seven tenths of its surface, and in parts are known to be more than eight miles in depth. The theory of internal heat, the result of figures, is that at less than a mile and a half in depth from the surface all water boils; at less than five miles lead melts; at seven miles the earth is red hot. Must not the seas and oceans with such heat beneath them—unfailing too, because increasing in intensity below until it melts iron and platinum, and goes on increasing after that—must they not all be boiling cauldrons? And this is an earthquaky globe, even now-a-days, and the bottom of a cauldron might crack, one would think, and that is why I am puzzled about the house-building and ship-building of those who believe in this fire; because if the oceans poured into the hollow furnace through a crack somewhere, such heat would generate such steam as would blow the whole planet to atoms. We have earthquakes even in our days, and they must happen more often at the sea bottom than on the dry land, because the space is as seven to three. But in the world's past history they were much more tremendous; as the crust of the earth bears witness; the highest mountains having been sea-bottoms. That all this has happened without a blow-up, and that the ocean cavities are not cauldrons of boiling water, is positive evidence that the earth is *not* red-hot at seven miles from its mean surface; and hot enough to melt gold at twenty-one miles; and cast-iron at seventy-four miles; and soft-iron at ninety-seven miles; and platinum

at one hundred miles. And they say it *is* so. And it must be remembered that in the earlier days of the earth's history it is supposed to have been still hotter than as above stated ; and its intense fires still nearer to its surface ; for it is part of the hot theory that the earth is a cooling globe—cooling from that nebulous origin. The theory says that below the one hundred miles the heat is so intense, even now, that nothing, not even platinum, can remain solid, but must vaporize. That would leave the ball hollow with intense heat all within one eightieth of its diameter of 8,000 miles, a mere rind being solid, and seven-tenths of that rind covered with cold oceans and seas, and even perpetually frozen at its poles. Leaving out the question of the unvaporized water, and the perpetual ice on this bomb-shell full of intensest fire, how during all the ages could it possibly have escaped the annihilation to which I have referred ? Mr. Laing says : " What actually occurs at great depths we do not know with any certainty, for we are not sufficiently acquainted with the laws under which matter may behave when under enormous heat combined with enormous pressure." I fail to see the enormous pressure, as here supposed, to be a factor, and we certainly know enough of the laws to know that heat is not restrainable by pressure, being so subtle as to pervade and pass through all things regardless of their pressure.

So utterly small as we find our globe to be in the universe of globes, it is yet too large for our very limited comprehension. We really cannot grasp the two terminals of the 8,000 miles of its diameter ; so let us reduce it to an imaginary diameter of eight feet, then we shall better comprehend our subject. We imagine, therefore, a section of a circle eight feet in diameter which is on a scale of one foot to one thousand miles, or one sixteenth of an inch to a little over five miles. Define the eight feet circle with a black line midway between one sixteenth and one eighth of an inch in thickness, and the inner edge of that black line is not only in contact with, but is plunged into, the red heat of the theory. The red line within that should be only about one sixteenth of an inch thick ; then orange of the same thickness ; then yellow of the same ; and then you have got beyond the 21 miles of the theory at which gold melts, although you have only penetrated to a little more than a quarter of an inch in your eight feet of diameter. Now proceed with paler yellow, paling

into white at one-and-a-quarter inch farther on, and you will have proceeded right beyond the heat of the theory at which platinum melts and vaporizes ; and nothing known to us can maintain solidity after that. So the solid crust of your eight feet globe is only less than one eighth of an inch ; and even then the softer metals are fluid ; and at a quarter of an inch gold is fluid. What do you think of that with cool oceans and seas covering seven tenths of its surface, and reaching in depths right below the red hot line, and no blow up ; and perpetual ice at each pole ? You must look at your eight feet circle to appreciate all this ; and remember there is no more colour to be added after the total shading of the one-and-a-half inch, because all within that is dazzling heat, too bright for any tinting, and too bright for any white. Fancy a dog crouching on that furnace-globe and howling ; not with pain of heat, but with pain of cold ! Do we not know enough of "laws" to know that there is no material on the earth which could prevent that mass of white, or rather, bright heat from penetrating that thin rind, and shining and burning as fiercely from the surface itself of that eight feet globe, as an inch-and-a-half within it ?

And now let us see how conflicting and self-contradictory these theories may prove to be when searched to their logical conclusions. The same men—great, wise, and truly learned men, entertain the two theories of the earth's nebulous origin and a cooling globe—cooling from that origin, with these intense internal fires still burning. They do not even entertain them as two theories, but as only one theory.

I hope I made it clear that the several world-materials being each only capable of vaporization at differing degrees of heat, must collapse, or condense, from vaporosity into liquidity, and congeal from liquidity to solidity, only at the lapse of the respective degrees of heat which held them vaporous or liquid. For instance, the heat which would keep lead in a state of vapour, would leave gold, iron, and platinum, still solid. Then the heat which would render gold vaporous, would leave the lead still vaporous, and the iron and platinum still solid. Then the greater heat which would render iron vaporous would leave platinum still liquid or solid, and the gold and lead still vaporous, until the temperature was attained which would vaporize the platinum, and all would be vapour, according to the nebular theory. Then, according to the same theory a *gradual* cooling takes place and it must follow

that when the heat declined from the degree necessary to keep platinum vaporous, the platinum must re-condense to a liquid and solid, and the platinum alone ; until the decline passed down from the degree necessary to keep iron vaporous, and then that must condense also, and lie outside the platinum ; and then the gold ; and so on until all the vapours had at length condensed ; except those which the temperature never sufficiently declined to condense, namely the atmospheric gases. Here you have a theoretic process of the creation of worlds out of nebulæ, which *must* begin with central solidity, and solidity extending gradually from that centre to the exterior. Yet we are asked to receive as an axiom, a resulting earthly condition at this moment such as is shewn on your eight feet section of a circle, with a vaporous interior and a solid crust only !

The idea of a mass of glowing gas slowly cooling and permanently encrusting on the exterior, and still enclosing glowing gas, is utterly inadmissible and contrary to natural laws. There must be, if exterior condensation all round, a falling inward and revaporation, with rapid diffusion of heat, and ultimate central solidities in the rotation which I have named, leaving the uncondensed gases still outside, as we have them in our atmospheric air ; still gaseous, but only by means of the sun's heat, not independent self-contained heat.

You must wonder how great minds—minds enriched with so much true knowledge, can find room for such false conclusions among their gems of truth. I wonder at it. *But it was ever so.* Glance again at this nebular theory which we have already looked at so much. A nebulous mass reveals by the spectroscope such colours and lines as the burning sun reveals, indicative of burning materials with which we are familiar as the constituents of this earth. It is therefore rationally decided that such nebulous mass—the Milky Way for instance—is composed of suns, which suns are composed of materials with which we are familiar, as sun and world matter. Then we examine another nebulous mass, which does not yield the same results to the spectroscope, but only what seem to indicate the presence of three gases, but only *seem*, namely hydrogen, nitrogen, and one other. The imaginary description which I just gave of a nebular deposit of a globe was richer in imaginary material, because we could not get even the imaginary globe without the imaginary material. But spectroscopic experiment has only yielded these three supposed gases,

and they are considered sufficient for the foundation of a nebular theory. Now how can suns and planets and satellites such as ours, be deposited from three such gases? Yet the philosophic mind concludes and declares at once that this particular nebula, and all such, are embryo stellar systems, in spite of the fact that we do not discover therein any evidence of the various burning materials of such stellar systems. Then we have placed before us at Cardiff the astounding theory that the origin of these origins of astral systems may be smashed up old dead and dark suns, re-ignited and rejuvenated by mere collision; a theory no happier than the nebular and earth's-central-heat theories themselves. Had the suns been suddenly blown out in the midst of their full effulgence, collision might re-ignite them; but not otherwise; and there is no such theory before us. If after their natural death the dark suns retained the latent heat of dark terrestrial bodies, which the latter retain while still fed and bathed by the living sun—and we don't know that they would retain it after the cessation of that outer supply—then collision would reveal a certain *dull* vitality; but not a renewal of refulgence; much less a new nebulous patch of glowing vapour. Let me take for example the career of a shooting star: Although a great mass of metallic iron, it rests weightless in space until the earth approaches near enough to cause it to yield to the earth's attraction of gravitation. It then approaches the earth, with rapidly and uniformly increasing velocity. But for aught we know, however great that velocity, no consequent change takes place in its temperature until it dashes into our atmosphere of oxygen and nitrogen gases, themselves immense stores of latent solar heat and light. The aerial friction of the rapidity of its flight now raises its temperature; and gives the oxygen an opportunity to prevail against its dilution of nitrogen; and to unite with the iron which it so dearly loves; to do which it has to part with its latent store of light and heat of gaseity, and become wedded to the metal, a solid with a solid. In the act of union it becomes the bright shooting star; and then disperses in a million wedded units of dust of oxide of iron falling from heaven to earth; like the union of body and soul—Cupid and Psyche; both heavenly—the oxygen and the iron—but in their union cast down from heaven to earth. And here they may be more useful than they ever were before; although they certainly seem not to be wanted, their market

being seemingly greatly overstocked. Still some of that iron may find its way through vegetation into the veins of some sweet pale daughter of God, who was sickening for want of red corpuscles; and it may help to give the beautiful glow of health to her cheeks, the brightness of joy to her eyes, and the general elasticity of renewed strength to her godlike form. So great is the love of oxygen for iron, and of iron for oxygen, that they unite spontaneously whenever they *meet alone*; without the aid of external heat or the heat of friction; yielding always the same brilliancy of light which we see in the shooting stars. But this combustion of iron meteors does not take place in outer open space, with no oxygen to yield its store of latent light and heat. Nor would the oxide of iron, or rust, resulting from this starlike combustion, if gathered together and pressed into ever so compact a mass, ever yield again those brilliant stars or that star which resulted from the ignition of the metallic iron in oxygen, or oxygenized air. Although impact might develop the ordinary duller spark of the erst general latent light and heat of solidity; heat and light, however, not latently its own, but derived, like the currently sensific light and heat, in continuous supply from the living sun; and not to be sought for in dead suns; unless, possibly, at that final period of universal diffusion of light, which I have imagined. Oxygen and iron are among the constituent materials of suns; and doubtless contribute this their share of light and heat; and when such processes cease, from exhaustion, and the gratification of affinities, no collision can possibly cause such processes to be renewed, the necessary light and heat having darted off into infinite space at the decease of the suns.

If another illustration were needed we might refer again to the light-giving flint and steel. The same chemical action goes on there as in the shooting star. You raise the erst latent temperature by impact sufficiently to allow the oxygen to wed the particle of iron chipped off, as already described. If you wore out the steel and used it all up in bright little stars by impact with the flint, and saved every atom of the oxide resulting, and made all that oxide ever so compact again, you might strike and strike but would obtain no more bright little stars. Then, you will enquire, is not the metal recoverable from the oxide, and might not the dead cold oxides of dark suns be recovered as metals again? Yes. But not by any remaining inherent heat. There must be a fresh supply of that mystery externally. Let

us stick to the iron in our illustration : The oxygen can never of itself divorce itself from the iron ; and again recover that heat and light which it parted with ; either as a constituent of a sun, as a shooting star, or as the illuminator of the tinder-box. But there are two external powers which, when combined for the purpose, can effect that divorce. They are a fresh external supply of sensific heat, in combination with carbonic vapour. Much as oxygen loves iron, it loves carbonic vapour more ; and carbonic vapour is ever eager for the alliance ; by which it becomes promoted to carbonic acid gas. Thus sufficient heat and carbon combined will de-oxidize iron rust, and restore the metal ; but no collision in empty space could do it. This de-oxidation of iron is going on constantly in our blast-furnaces.

I will beg leave to shew in my next letter the error which led to that absurd calculation of the intensities of the earth's internal heat.

In dealing with such a myth exactness of illustrative figures is unimportant. You will see that I have been liberal with the crust on the eight feet mental diagram ; giving each shade of colour such full measure that the whole solid and melted totals up to over one-and-a-half inch, or nearly one hundred and fifty miles ; instead of one inch and one fifth of an inch, or one hundred miles ; which is the estimate of most great philosophers ; or 100,000 feet, which would be nineteen miles, the estimate given in "Modern Science and Modern Thought." So, you see, I have been positively liberal with that crust.

As to the Cardiff address ; while I have objected to what appear to me to be some unsubstantial opinions of a great philosopher, I do so with respect and veneration. Dr. Huggins is a truly great astronomer to whom the age is indebted ; and he was the dearly valued friend of the divine Procter.

My entomological visitors are with me again to-night performing all sorts of wonderful evolutions in the lamp-lit air of my room. They are all very good dancers on the wing, but are dancing rather mixedly ; and they are all very well dressed ; some of the robes being quite grand, and beating all woven silks and satins and velvets ; and in excellent taste ; beautiful rich sheeny brown and pale gold prevailing. Some of them rush at me now and then with a touch on the cheek which I know not whether to take for a blow or a kiss.

Surely all these wonderful and beautiful—even magnificent—and apparently happy recurrent stages of insect life, brief as they are, can-

not be mere passing vanity. Surely these stages, and all stages, are part of the stupendous passing scheme of stupendous eternal good. We may rest assured that all this wondrous life is not mere waste in its appointed death. Some think that these countless fragile little bits of life, are too tiny and brief to be included in the great blessing of the progress of terrestrial life and death. But when it becomes a question of magnitude and duration, what are we; the living and dying lords of that terrestrial progress; as individuals or as multitudes, in the great cosmic universe? What is there of magnitude even in our entire world itself in its comparison with the infinitely scattered stellar gold-dust of Space? We may well ask, What magnitude have we, whether as individuals or crowds of thousands; on the surface of this our tiny speck of that cosmic gold-dust? So small upon the small are we, that if we ascend one of the pimple mountains of this little globe, and look down upon the populous plain, the inhabitants are so small as to be utterly invisible. And if they on the plain look up to the pimple mountain, the lordly observer there is too small to be distinguishable. Talk of size! there is very little difference between these gay and happy visitors of mine and myself in the great cosmic scale of comparison. And as to terrestrial duration, or life duration, there is not so much difference between their time and our time, if both were compared with eternity; which *we* cannot do. It is true one might press one of the smallest of these wonderous things between thumb and finger, and only soil thumb and finger each with a patch of pale feathery gold-dust. But those patches of feathery gold-dust are but the mechanical ruin of a marvellous, incomprehensible, divine thing; apart from the mystery of its gone life. Only think what divine mechanism lies there all crushed out of use; the mechanism of wonderful legs and feet for speed of running; and of wonderful wings for speed of flying; and that inexplicable steerage power; which enabled it to join the crowded mazy wing-dance without danger of collision; or any other danger that could be avoided by power of instantaneous steerage and guidance or reversal of progress; in every direction, however swift the flight.

However fragile and short-lived are the individuals of this crowd of night-visitors, I see while I watch them that their creation is too marvellous to have been in vain; and I firmly believe their brief lives to be mysteriously included in the great blessing of terrestrial life and

death. And as to their death, I am happy to say that my fingers have never been soiled with the feathery gold-dust of that : but only sometimes with a little sparkle of it in effecting a rescue from death.

LETTER XV.

WHY THE TEMPERATURE INCREASES IN THE DESCENT OF A PIT.—SIMILAR INCREASE IN THE DESCENT OF A MOUNTAIN.—THE EARTH'S ABSORPTION AND RADIATION OF HEAT.—INCREASE IN DESCENDING A PIT NOT UNIFORM.—THE ORIGIN OF VOLCANIC FIRES.—SILURIAN COAL.—THE REMARKABLE FURNACE.

20 SEPTEMBER, 1891.



T is true, of course, that in descending a boring into the earth there is a certain measurable increase of temperature down to a certain depth. That rate of increase of temperature is not uniform, but varies from one degree Fahrenheit in about forty-five feet, to the same in about sixty feet, according to the time of year of the experiment, the latitude of the boring, and some other circumstances. It would be also true, of course, that if either of the ascertained rates of increase of temperature continued to the centre of the earth, the heat claimed by those who relied upon these figures would be attained. But it ought to have been perceived by anyone making these calculations that they had false bases ; because if that internal heat had really existed, this globe must inevitably have been a small resplendent sun instead of a dark planet with perpetual ice at each of its poles, and dependent upon external heat for the fluidity of its waters anywhere on its surface. And that result ought to have been accepted as ample refutation of the *assumption* that the rate of increase of heat went on just the same beyond the limit of experiment, as within that limit. Had that reasonable reasoning been adopted, further research would, in time, have justified the inference of the logic of natural laws known to us, as I shall shew.

In the same way that the temperature increases as we descend a pit, so does it increase as we descend a mountain side. The atmos-

sphere has the capacity for detaining and accumulating, temporarily, the sensific heat of the sun's rays in proportion to the atmosphere's density. Utter void may be positively cold with the sun's rays flooding it. The most rarefied top of our atmosphere would be less cold than that, and the heat increases as the density from pressure increases, apart from the local distribution of pressure near the earth's surface, whether cyclonic, or anti-cyclonic as the case may be. It would be curious, therefore, if the same cause did not operate, in some degree, in continuing the downward march from the base of the mountain, lower still, below the mean surface of the earth. Thus the temperature might be higher in a pit filled with extra compressed air, than at the same depth of the solid earth, without the air. In 1882 my dear friend Clement L. Wragge was making his famous daily meteorological observations from Fort William to the summit of Ben Nevis and back again; and, towards the close of his labours there, at my request, he made for me an elaborate set of notes of altitude values in temperatures, types of weather, etc., at every 600 feet from Fort William—28 feet above sea, to the summit of Ben Nevis—4406 feet above sea. Those sheets are preserved between glass, and are behind such a large accumulation of other valuable documents similarly preserved that I cannot conveniently reach them at this moment to quote from them. I believe they shewed an increase of one degree Fahrenheit in distances varying from about 250 to 300 feet, according to the greater or less atmospheric pressure. But for our purpose the general fact is sufficient that the temperature increases as we descend a mountain into air increasingly dense. We see that the increase of temperature in the descent of a pit, is, at any rate, much greater than in the descent of a mountain and that is easily accounted for.

We know that the earth absorbs the sun's heat to a certain depth, and so by its radiation of what it accumulates by day, it tempers the cold of night; and by the more general and prolonged radiation of what it accumulates during the combined days of summer, it tempers the cold of winter. If it were not for this we should begin to have the colder weather set in, day by day, as soon as the sun began to turn back from us on the 22nd of June; but the accumulation of the heat of the long warm summer days in the earth's crust, is added to the daily current heat of the sun, and, although he is in recession, with a daily increasing declination, July and August, instead

of growing colder, are generally warmer than their predecessors. And the store of heat accumulated during the entire summer, between the two equinoxes, mitigates the severity of the entire winter, which we perceive more clearly in November and December; and which winter would afterwards be killing without it; although it has by that time become so largely used up. The cold of the said two months of November and December would also have been killing, with the sun's daily decline of heat, but for this aid of the earth's radiation. We have proof that this stored heat is exhaustive, and externally derived; from its comparative—only comparative—failure in January and February, whereby those two months, in spite of the sun's increasing rays day by day, are colder than the preceding, when his rays were the feeblest. Thus it is the heat received downward from the sun, and not from internal burning, which, added to the extra heat of the extra density of the air, also derived from the sun, gives the increase in the descent of a pit.

Now it does not seem unreasonable that the warmth of the summer should penetrate the skin of the earth—as that earth is represented by the eight feet mental diagram—to a depth of at least one sixteenth of an inch in the eight feet, or its equivalent, five miles in the eight thousand miles diameter, in our temperate regions; more in the torrid zone; and much less in the arctic regions.

And now we come to the “further research” to which I alluded, which was to contradict the assumption of the uniformity of the increase of temperature downward. I mentioned that the results of thermometrical experiments, so far as they went, had not been uniform, some giving an increase of one degree Fahrenheit in about forty-five feet, others the same in sixty feet, and others the same in various distances between those extremes. In the experiment the record of which is now before me, the increase was one degree in the first fifty or thereabout; but the distance gradually increased until at 1200 feet in depth, it was one degree in seventy feet, and the distances still gradually increased until at 1800 feet in depth it had become one degree in eighty-five feet. It is only a common-sense view of the subject that this declining or diminishing increase of heat should lead us to no increase at all; and then to a decrease; as it would be in accordance with the *fact* that the warmth of the extreme external case of the earth is derived from the sun as just shewn. And even some

of the declining heat just recorded must be derived from the presence of miners and horses and lamps. And it must be noted that the depth from the surface which positively gives this declining increase—this increasingly declining increase—is only 18,000 feet, a little more than one third of a mile, or about the fifteenth part of the sixteenth of an inch of the edge of our eight feet circle; less than the thickness of a thread of sewing cotton on the edge of that circle.

It remains now to speak of the heat exhibited in volcanoes, earthquakes and hot springs. My study of the Silurian formation has clearly shewn me that there was another Carboniferous Period, older than the one which we call by that name; and that it was a Silurian Carboniferous Period, of which that furnishing our coal-fields is a continuation. The subject is too large for these letters and must be taken for granted; or, if not, we must get on without it. What we call Silurian is merely sea and estuary bottom, and we know nothing of the lands from which the sea and estuary deposits were derived; but we have evidence that there were floral lands then, from occasional deposits of Silurian floral wreck carried out to sea, and there deposited and covered up, and converted to Silurian coal. There was some found in Ireland. Arnold Guyot, the very clever author of "The Earth and Man" speaks of the Silurian strata as the lands of the Silurian period and gives a map of them. But they really represent the water-basins of that period, and if we came across tracts of the lands of those days we should not know how to associate the two formations. The Silurian lands are probably beneath the oceans and beneath the volcanoes, with their coal-measures resembling our Carboniferous coal-measures; and have been food for subterranean fires, and great factors in the formation of the contour of the earth's surface as at present existing. If we suppose that this period furnished the fuel for a great part of the earth's eruptions, and we have positive evidence that vegetation then flourished and coal was produced, we want now the fire to ignite it. And that will not be difficult to find. We readily place together materials and form compounds which by slight friction start into flame, and it would be strange if such materials should never happen to be in company in nature, somewhere and sometimes without man's introduction. Then we have sometimes inflammable materials ignited by flashes of lightning. Then it is reasonable to suppose that among the primitive

materials of the earth there remained and still remain unoxidized masses of potassium, and such metals ; here and there ; which, when first reached by atmospheric air, or even water, would burn with a bright light and explosion in uniting with the oxygen of those compounds. Even metallic iron if reached by oxygen alone would behave in the same way. Then Calcium would give out heat during its oxidation by air and change to quick-lime, and the quick-lime again would give out heat when reached by water. In fact the instances of the generation of heat by the contact and chemical combinations of the earth's elements that I could name are too numerous to mention ; and there must be many others of which I am ignorant. But none of these natural chemical combinations which produce combustion, yield the black carbonic smoke and red smoky flames, which issue from volcanoes ; so the self-generated heat must have acted as a match applied to the fuel of a grate, and the fire burning below is coal, or the oily product of coal, and probably Silurian coal. These things being provided, all the rest is clear enough. We get the expansion of gases, by heat passing through rocks to where flames do not reach ; with ultimate catastrophes when the expansions of gases have reached to such extent as to open ways for their own escape, terminating gradual upheavals with collapse and sudden subsidence. Or water suddenly bursts into the furnaces causing explosion by steam. This steam is constantly issuing from active craters, and salt water itself is often thrown up from them. The area affected by such disturbances at the present time is very small indeed compared to the whole area of our eight feet globe, and gives no indication whatever of an incandescent interior. It is, perhaps, worthy of note here that a world created by the nebular process admits of no subsequent earthquakes. Its very gradual and slow cooling from a precipitated centre would have left case after case so solid and compact and so thoroughly burnt out, that there could have been no subsequent outbreaks, the heat having done all it could do from the centre outward, and then passed away into stellar space.

You know what ingenious, but now absurd, theories used to be invented centuries ago when primitive knowledge had been lost, to account for certain natural phenomena. We look back—some of us, perhaps—and feel how ignorant the wise men of knowledge were in those days ; and how easily people were gulled. Surely it will be no

less a matter of amazement to future generations to learn that in the nineteenth century, and towards its close too, it was taught in the universities that the earth was a globular furnace, which being reduced to a scale of one foot to a thousand miles, might be regarded as a furnace eight feet in diameter, containing a concentrated intensity of heat far exceeding that of a steel-furnace at its maximum glow ; which maintained, in a cool condition, an exterior case immediately against its fires, one sixteenth of an inch in thickness. Is not that indeed a wonderful non-conductor, which, so thin, and enclosing so intense a mass of ignition, with no other escape for interior heat but through itself, yet permits animals to lie down upon it and die of cold, frozen to death upon its surface, when there is not sufficient *external* warmth to keep them alive ? And of what material is this wonderful sixteenth of an inch of a case—this wonderful non-conductor, which contains and restrains this raging furnace ? Truly it is that same material which is so absorbent and conductive of *external* heat gently shed upon it from above—mere sun's summer heat—that it can receive and store up the warmth of the summer months, and yield it forth again in radiation into the atmosphere, so as to render December on the average warmer than January and February ; when, but for this solar-heat-conductiveness and temporary storage, December must be as cold as January and much colder than February. Surely this teaching of to-day is no less absurd than the worst mistakes of our philosophic forefathers.

Please note that all the calculations of the earth's interior heat which we have been examining, start, not from below the bottom of the sea, but, *in all cases* from surfaces of land *above the level* of the sea.

LETTER XVI.

A WONDERFUL MODERN MOON-AND-TIDE THEORY.—THE AGENCIES OF RIVERS AND TIDES IN FORMING STRATA.—THE CALM OF THE LOWER SILURIAN PERIOD.—INCONSISTENCIES IN ACCEPTED THEORIES.—A PERIOD OF CALM CRYSTALLIZATION PRECEDED THE GREAT GRANITIC DISTURBANCE.—THE FORMATION OF PROTOXIDE OF IRON.—MATHEMATICS DEALING WITH ERROR AS BASIS.—THE MYSTERY OF LIGHT AND HEAT.

27 SEPTEMBER, 1891.



READING on from page 37 of "Modern Science and Modern Thought" I find only surmises like those which I have been examining, offered in the name of science, but utterly worthless, yet truly worthy to lead to Lyell's conclusion that "geology requires a period of not less than two hundred millions of years to account for the phenomena which it discloses." There is no evidence whatever of this. And so, further on, "One of the latest speculations of mathematical science is that the rotation of the earth is becoming slower, or in other words the day becoming longer, owing to the retarding action of the tides, which act as a brake on a revolving wheel. If so, mathematical calculation shows that the effect of the reaction on the moon of this action of the moon upon the earth, must be that as the earth rotates more slowly, the moon recedes to a greater distance. And *vice versa*, when the earth rotated more rapidly the moon was nearer to it, until at length, when the process is carried back far enough, we arrive at a time when the moon was at the earth's surface and the length of the day about three hours. In this state of things the moon is supposed to have been thrown off from the earth, either by one great convulsion, or, more probably, by small masses at a time forming a ring like that of Saturn, which ended by coalescing in a single satellite. With the moon, which is the principal cause of the tides, so much nearer the earth, their rise and fall must have been something enormous, and huge tidal waves like the bore of the Bay of Fundy, but perhaps 500 or 1,000 feet high, must have swept twice during each revolution of the earth on its axis, i.e., twice every three or four hours, along all the narrower seas and channels and over all except the mountainous lands adjoining.

"Now these conclusions may be true or not as regards phases of the earth's life prior to the Silurian period, from which downwards geology shows unmistakably that nothing of the sort, or in the least degree approaching to it, has occurred. But what I wish to point out is that all this superstructure of theory rests upon a basis which really does admit of definite demonstration and calculation."

I cannot see this. If "these conclusions may be true or *not*" "this superstructure of theory" cannot rest "upon a basis which

really does admit of definite demonstration and calculation." If the conclusions be *not* true they must rest altogether on a false basis of false figures and calculation.

Fancy a tidal wave 1,000 feet high rushing over this globe at the terrible speed of twenty-four thousand miles "*twice* every three or four hours" caused by the moon "when the moon was at the earth's surface," without that moon becoming a perpetual part of the earth itself, by means of their mutual attraction of gravitation when so near! And there are evidences of life upon the earth during this period. Some pounding process seems to have been in operation during the period of Chaos; which broke up the rocks of felspar, oxide of iron, quartz, mica, and other minerals; and pounded them into grains, larger and smaller; which, subsequently, while yet in loose grains, became the grave grounds of shells, or houses of life; and, after that, were cemented into granitic masses. But no impossible moon, rolling on the surface of the earth, could have done it; and then left a Silurian calm to follow. See what extremes we get in these mere theories: the very very slow formation of strata; and the very very fast passage of this 1,000 feet high tidal wave, traversing twenty-four thousand miles in, from an hour and a half, to two hours; and that incessantly for ages; and the moon spinning round the earth's surface at the same rate. My friend Mr Clement L. Wragge was in Edinburgh enjoying the pleasant society of the philosophers of that Athens in December 1881, when it became no longer possible for him to continue daily the ascent of Ben Nevis to make his meteorological records; and he wrote to me from that city asking an opinion on the question of the ancient tides, and their agency in the formation of strata; to which I replied in some such sentences as the following:

"At the present time rivers do more to form new strata than do the tides; and I believe it has ever been so. The rains which fall upon nearly the whole surface of the land, carry in their floods into the rivers fine and aqueously portable matter; and so, gradually, by the aid of disintegrating frosts, where frosts are, scrape the general surface pretty considerably; and the great rivers, by their strong deep currents, carry the burden a good distance out to the sea-floor. The action of tides is more limited in its power of portage, not operating very deep down from the surface, nor far out from the land-fringe. The effect of the tide upon a continent which was just emerging from

the sea, and was washed by a very shallow sea rushing to and fro incessantly over the greater part of its surface, was another thing. I am writing a pamphlet on Silurian times ; the result of my own observation of Silurian rocks ; and that observation has clearly shewn me that at the Lower Silurian Period the action of the tides was less powerful, *on the site of BRITISH Siluria, than it is now on the coasts of that region.* My reasoning will appear in the pamphlet. I shall shew where the error lies in the calculation of *time* necessary for the deposition of strata. The Darwinian theory that 54 millions of years ago the moon *nearly touched the earth*, and revolved round it in three hours, should be taken not with a grain, but with a table-spoonful of salt. It is a pity there should be found a school to listen to such baseless and useless imaginings. They are only propped up and presented to the simple mind by sleight-of-hand treatment of science. I shall shew that the invention of even a palæozoic tide merely 648 feet high, presented by Professor Ball, is not at all necessary to vastly curtail the orthodox geological reckonings of time necessary for the deposition of the earth's strata. And I am not going to offer theory against theory, but intelligible fact and reason against theory. I have not the impudence to offer scientific *opinions* ; but, where I find inexorable logic at my command, I shall not fear to make use of it, no matter whose house of cards it may knock over."

I have already given in these letters some of the reasoning and facts which abbreviate the long periods claimed for the deposition of strata ; and need not go into the question of the Silurian strata here.

It seems to me a curious thing, a confounding of causes and effects again, to claim that our present tides "act as a brake on a revolving wheel" so retarding the revolution of the earth on its axis, and to invent a tide a thousand feet high, and a day of three hours instead of twenty-four hours, simultaneously, through ages during which the earth ought to have been stopped altogether in its axial revolution long before this, by such "a brake on a revolving wheel." I should say that if ever the days were shorter than they are now, it would be due, not to the moon, but to the geological contour of the earth at the time, and the prevalence of more and steeper escarpments for the solar radiance to act upon with a force which is proven to be a force. And such shorter days with proportionately accelerated orbital revolutions, might account for the numbers of years

of the lives of Methuselah, and his progenitors and successors. But this is not science, nor even speculation, for I do not offer it seriously. Instead of the tidal hill of water acting as a brake on a revolving wheel, even at this day would not the higher permanent mountains of rock act much more powerfully so ; if they did not, indeed, act just contrariwise ; as I have shewn they must do ?

I have spoken of the time during the period of Chaos when the rocks of felspar, quartz, oxide of iron, mica, and other minerals, were broken up into grains. But there must have been a period of calm preceding that, during which all the constituents of those minerals were combined ; for they are all compounds of metals, or bases, with oxygen, and other matters, and water ; the felspars being complex compounds of several metals, or bases, with oxygen and water ; and they would each require a period and situation of perfect calm to crystallize as they have done, before forming the materials of granite. And the oxide of iron—and the iron is metallic in the meteors—would require a period of calm and isolation to protoxidize in compact masses. What was the moon doing then ? And that period of calm crystallization was not the primary period ; for there must have been one of uncompounded and unoxidized metals, when they were in the meteoric condition.

In objecting to man's futile attempts to create suns and worlds in vain theories, I don't think I shall attempt to take the place of the Almighty Artificer, and myself seek to mentally create, in some way of my own, the infinite astral systems. It is enough for me to shew the failures of others in attempting the same, by "*speculations of mathematical science.*"

The Present will become the Past, and all these theories will go with it, and become the theories of "old authors" added to the theories of authors already old. And then will apply to them the words of a young astrologer written in the first half of the seventeenth century, to be uttered by some young philosopher of the twentieth century : "I cannot build my faith upon authors' words, nor believe a thing because they say it, and could wish everybody were of my opinion in this, to labour to be able to give a reason for everything they say or do. They say Reason makes a Man differ from a Beast ; if that be true pray what are they that, instead of Reason, for their Judgment, quote old authors ? Perhaps their authors knew a Reason

for what they wrote, perhaps they did not ; what is that to us ? Do we know it ? " We can get at certain details of the Creation by analysis ; but, depend upon it, we shall never be able to get at a true mental synthesis of the whole, until we " come of age," and gain that liberty which your own imagination sometimes enjoys—" liberty to watch as an angel some new world or sun in course of creation."

Let it not be supposed for a moment that my reference to that period of Chaos when granite was pounded into grains, suggests the idea of an age of such very extraordinary violence as that of a tidal wave 1,000 feet high, continually rushing over the surface of the globe at a speed of 24,000 miles in one hour and a half. Such violence as that must in a *very short time* have broken up and levelled the entire surface of the globe, and rendered all its various materials into one *uniform mass of clay*. The work of stone-breaking is being done by the waves of our own coasts at the present day. But in the chaotic pre-granitic age it appears to have been a work accomplished all at once all over the globe, at times, and then suspended, before the grains were completely rounded—for many of them *are partially* rounded—and before the further abrasion reduced the whole to clay ; for all clay is of much later formation, as I have shewn in "Cloud Hill." It seems to us that no life could possibly have existed during such a period ; and that it must have been succeeded by comparative calm long before the Silurian period, or even the Cambrian ; for in the Laurentian granite there are found embedded, as I have said, shells, or houses of life. Some people write about the constituent grains of granite as if they were each original, separate, complete, crystals. But they are not : they are all broken fragments of larger crystallizations—except the cementing matrix—the result of a force suddenly arrested, as their very partial rolling or rounding indicates. I have written about this more fully in another work.

When I spoke of a calm time being necessary for the protoxidation of masses of solid iron, which have been since broken up in the granite, I ought to have explained that all the oxide of iron in mass, in the oldest granite and other old rocks, is in the lowest state of oxidation called the protoxide, which is black or blueish, in distinction to the peroxide, which is the highest state of oxidation, and is red. The former therefore was not suddenly produced by ignition, like the meteors passing through the air, nor by exposure to pure oxygen,

which would have caused instant combustion ; but was oxidized in an atmosphere short of oxygen, but *plus* carbonic acid gas, whereby all oxidations would be slow, probably much slower than the production of red rust, or peroxide, in our present atmosphere.

I have at present no idea what Mr Laing is leading up to in his book, as I have not read a page in advance of my current comment ; but the author himself, while he seems to be accepting the theories, and to be using them as materials in the foundations of some structure, furnishes an example on pages 43 and 44 of the unreliability of the mathematical calculations with which the theories are built up.

He mentions that Halley found, from the records of ancient eclipses, that the rate of the motion of the moon must have been slightly slower then than it is now ; and that "Laplace apparently solved the difficulty by showing that this was an inevitable result of the law of gravity, when the varying eccentricity of the earth's orbit was properly taken into account ; and the calculated amount of the variation from this cause was shown to be exactly what was required to reconcile the observations." This would be proclaimed as a great triumph of figures—an exact mathematical triumph, taking the conclusions entirely out of the regions of theory. But, lo, the "exactly what was required" was far from mathematical infallibility. It was a case to strengthen the young astrologer's non-reliance on the mere word of "old authors." Mr Laing continues :

"But our great English mathematician, Adams, having recently gone over Laplace's calculations anew, discovered that some factors in the problem had been omitted, which reduced Laplace's acceleration of the moon's motion by about one-half, leaving the other half to be explained by a real increase in the length of the sidereal day, or time of one complete revolution of the earth about its axis. The retardation required is one sufficient to account for the total accumulated loss of an hour and a quarter in 2,000 years ; or in other words, the length of the day is now more by about $\frac{1}{84}$ th part of a second than it was 2,000 years ago.

"At this rate it would require 168,000 years to make a difference of one second in the length of the day ; 10,080,000 years for a difference of one minute ; and 604,800,000 years for a difference of an hour. The rate would not be uniform for the past, for as the

moon got nearer it would cause higher tides and more retardation ; still, the abyss of time seems almost inconceivable to get back to the state in which the earth could have rotated in three hours and thrown off the moon."

Although Mr Laing is seeking to lead us by these awful figures—all based upon a doubtful beginning of a gain of one 84th part of a second in 24 hours, after the lapse of 2,000 years—through the "abyss of time" to when the hours of the day were three only, and the moon was at home on the earth, he wisely admits that :

" If the original data are right, mathematical calculation inevitably gives right conclusions. But if the data are wrong, or what is the same thing, partial and imperfect, the conclusions will, with equal certainty, be wrong also."

Just so. And therefore if that 84th part of a second in the day, which is supposed to be gained in 2,000 years, be only just one 84th part of a second wrong, during the days of all the 2,000 years, we don't get even the one hour, nor a second of the one hour, which at that rate it would take 604,800,000 years to get. It is these mathematical figures piled upon myths which dot the mental horizon with so many mountains of error—worse than mountains of ashes.

Mr. Laing then goes on to speak of the small proportion of the sun's radiance which is utilized by the planets, compared to that which is "apparently lost" in space. This I have already referred to in these letters rather fully, not knowing that the subject would be alluded to in this book. It is quite correct to say "apparently lost." But I do not believe that a ray of the light and heat of the sun, or any of the suns, is lost. I was taught that light and heat were matter. They are as I have said a dual mystery. Heat passes through all matter, however solid, and it passes through itself at all angles without impeding itself in the slightest degree. And see how even sensific light passes through some dense masses of matter unimpeded. This is a wonder we are so used to that we don't wonder at it. Yet it is curious to think of light flooding through glass. We say it is because the glass is transparent. The wonder is no less ; for the glass is only transparent because the light floods through it—a solid—unimpeded. Light and heat are a dual divine mystery—a sort of spiritual mystery—and I fully believe it is an immortal something which has spiritual uses quite apart from being the life of the physical

globes. Things are provided by the Provider in abundance for various purposes ; some of which purposes are utterly hidden from us at present. And the divine spiritual mystery of light and heat from the suns, may be doing some duty in spiritual worlds of space, of which the dreamer of the most vivid ecstatic dreams can form no conception.

LETTER XVII.

CONTRADICTORY MODERN THEORIES OF THE SUN.—THE MYSTERY OF LIGHT AND HEAT AGAIN.—CAUSE OF THE BLUENESS OF THE SKY.—THE WAVE THEORY OF LIGHT.—THE BREATH OF A SLEEPING INFANT.—THEORY OF 4,072,000,000,000,000 EYE FIBRILÆ VIBRATIONS PER SECOND.—LIGHT UNENLIGHTENED.—THE SOLAR SPECTRUM.—CRIMSON.—OBSERVATIONS NOTED WITH A PRISM IN HAND.—THE SUNSET.—ALL COLOUR A DIVINE AND ETERNAL MANIFESTATION.

11TH OCTOBER, 1891.

E continue to have not only utterly baseless, but contradictory theories presented to us as we proceed. On page 45 the cause, and cause of continuance, of the sun's heat are discussed. After the quotation of figures the author says :

" Yet there can be no doubt that vast as these figures are, they are all the result of natural laws, just as we find the law of gravity prevailing throughout space at distances expressed by figures equally vast. The question is, what laws? The only one we know of at present at all adequate to account for such a generation of heat, is the transformation into heat of the enormous amount of mechanical force or energy, resulting from the condensation of the mass of nebulous matter from which the sun was formed, into a mass of its present dimensions. This is no doubt a true cause as far as it goes. It is true that as the mass contracts, heat would be, so to speak, squeezed out of it, very much as water is squeezed out of a wet sponge by compressing it. But it is a question whether it is the sole and sufficient cause."

Here we are supposed to get heat from gradual contraction, given out by the larger nebulous mass, or "squeezed out of it" as it became more dense, consequently when the utmost density had been reached, there would be no more heat to be squeezed out, and the supply must soon cease after solidity. On the next page we read :

"It has been said that the constantly repeated impact of masses of meteoric and cometic matter falling into the sun must have caused the destruction of a vast amount of mechanical energy which would be converted into heat. This is true as far as its goes, but it is impossible to conceive of the sun as a target kept at a perpetual and uniform white heat for millions of years by a rain of meteoric bullets constantly fired upon it. More plausibly it is said that we know nothing of the interior constitution of the sun, and that its solid nucleus may be vastly more compressed than is inferred from the dimensions of its visible disk, which is composed of glowing flames and vapours. This also may be a true cause, but, after making every allowance, we must fall back on the statement that the continuance for such enormous periods of such an enormous waste of energy as is given out by the sun, though certainly explainable by laws of Nature, depends on laws not yet thoroughly understood and explained."

Yes indeed ! These last words, if I may presume to say so, are words of true wisdom. What a prevention of error, and prevention of waste of labour, and prevention of dust and blindness, would have resulted all along the line of the ages of scientific research, if philosophers had been content to say of mysteries, "They are explainable by laws of Nature, not yet understood and explained," instead of inventing false and misleading laws of their own. I hope I have said with sufficient emphasis that Mr. Laing is not responsible for the various inventions of this sort which he has adopted.

The last "it has been said" paragraph belongs to the side of argument which relies upon an intense extra density of the material of the sun's interior as a reserve of future fuel and light and heat—just the reverse of the previously quoted theory which regarded the heat as "resulting from the condensation of the mass of nebulous matter from which the sun was formed," in which case the final solids would be merely used up residue ; and, so far from furnishing the future supply, when the utmost density had been reached the supply must cease, as I said before, according to this theory. Besides noting

these contradictions we must remember that it is not true that the comets fall into the sun, and we have no reason to suppose that any meteoric matter does so. We have seen that the sun's repulsion of radiance overcomes his attraction of gravitation, when such things approach near enough. And if such things as meteoric metals could be drawn into the sun, I fail to see how they could carry any heat with them. They would require the previous heat of the sun itself, or of its heat-containing gaseous envelope, to cause the metals to burn. We know of no other appreciable source of heat in all our solar system, except the comets—no heat of importance to us—but what emanates from the sun itself; whether that be sensific or latent; in gases, liquids, or solids; seen and felt, or unseen and unfelt. The heat resulting from the impact of bodies within our solar system can only be the manifestation of heat derived from the sun and reserved in mysterious latency; but which we might expect would start from its latency and diffuse itself in space the moment the sun ceased to keep up the supply; as we have evidence in the invisible watery vapour becoming cloud, and the cloud liquid, and the liquid solid; by parting with its three respective stores of latent heat as soon as the sun ceased to supply enough to keep up those respective stores. And that heat of vaporosity and of fluidity departs in general diffusion; and so, we have reason to believe, would the heat and light latent in solidity depart, if the sun ceased the general supply; and become part of a general, eternal, even, diffusion in infinite space. In other words, we may expect the electric light to be quenched when the sun is quenched; and to ponder on this idea will lead to more fully developed thoughts on the subject, which are in my mind but unexpressed. I know there is an attempt to make out heat to be something else than heat. But it is a remarkable thing that by whatever other name we call it, it remains the same; the same unsolvable mystery; the same ever active, ever diffusing mystery of infinity; even in its so-called state of latency.

Further on the author recognizes the inconsistencies of some of the theories which he has brought forward; and then in a new chapter plunges into the study of MATTER. But although the chapter is so headed, it actually treats of "Ether and Light—Colour and Heat—Matter and its Elements—Molecules and Atoms—Spectroscope—Uniformity of Matter throughout the Universe—Force

and Motion—Conservation of Energy—Electricity, Magnetism, and Chemical Action—Dissipation of Heat—Birth and Death of Worlds."

I shall not attempt to discuss the Wave Theory of Ether and Light. There are some people who seem to understand all about it ; and as I do not, I shall leave the subject to them. I think I quoted in a previous letter, but not in this "Modern Science" series, a paragraph on the subject which I wrote some years ago during the days of the remarkable Sun Glows. The question which I handled in the Fourth Letter on the "Sun Glows" was "The Cause of the Blueness of the Sky." Which I found to be owing to the great quantity of blue water held in solution in the air ; after shewing which came the following :

"In regard to the cause of the blueness of the sky some readers are enquiring why, if it be due to the colour of the watery vapour held in suspense in it, Dr. Tyndall should say, 'The sky is blue, which indicates an excess of the smaller waves.' Although that distinguished philosopher has made many elaborate experiments to ascertain, if possible, whether the blue of the sky might be due to the polarization of sky-light, the above sentence merely refers to the wave, or undulation, or vibration theory of light ; and might be said of the blue whether obtained merely by polarization, or through transparent watery vapour. The tremendous and mystic theory of light I must not enter into in these letters ; further than to say that according to it colours are only perceptible to the mind by means of vibrations which they communicate to the fibrilæ of the retina of the eye ; and before one can realize the colour of an orange, one's eye must be subjected to 542 millions of millions of vibrations. I expect the reader, like myself, has a horror of 542 millions of millions of anything ; although we are all aware that infinite space must include any quantity of such quantities of movements, and think nothing of them. It is equally certain that even one puff of breath of a sleeping infant may influence the motion and direction of as many millions of millions of molecules and elementary atoms of gases and vapours. According to some mathematicians, the vibrations of brain-matter caused by mere thought, influence the entire envelope of the globe ; and some go further still, and declare that these vibrations of brain-matter reach on through *infinite space*. If so, the breath-puff of the slumbering infant has an influence upon all the worlds of the infinite

cosmos, including heaven itself, and—another place. But I don't go to their school, and so the idea that the retina of my poor eye must undergo the stated number of vibrations before I can see the yellow of an orange which I hold in my hand, much more taste its interior, is not pleasant. And what will become of the vibrations, and to what part of the brain will they be transferred, if I close my eyes, and bind them with blind-man's-buff bandages, and then let a flood of the yellow colour into my mind through another gate—the gate of imagination ; or even spread out in it with vivid richness a whole 'field of cloth of gold,' with two gorgeous kings and their brilliant retinues moving about thereon ? Now whatever may be the best theory of the mind's perception of colour revealed by white light, as the blue of the sky certainly is—whether it be by vibrations of varying intensity or not, my statement that watery vapour adds blue to the atmosphere is no theory at all ; but the statement of fact which anyone may demonstrate. Fill with water a cavity six feet deep, lined with pure white ; and if the azure tint be not pure, the water is not pure. Catch it direct from heaven through a clear atmosphere, and it will be azure. Make the white pit twelve feet deep, and the blue will be proportionately more intense. To go deeper and deeper would be to lay on shade upon shade of transparent blue until you obtained the depth of colour of indigo. We know that there is a great quantity of transparent water in the air on a clear cloudless day, and we may be sure it could not be there without exhibiting its blueness."

In regard to the millions of millions of vibrations which each colour is said to cause per second in the retina of the eye, and which must be experienced before the colour can be realized there, I am afraid the eye has still more to undergo—awfully more—when there is no colour at all to realize, but only white light. These are the words on page 54 following the list of the colours of the spectrum and the numbers of oscillations per second assigned to them :

"These are the colours whose vibrations affect the brain through the eye with the sensation of light, and which cause the sensation of white light when their different vibrations reach the eye simultaneously."

Now the total of the vibrations which thus reach the eye simultaneously is 4,072,000,000,000,000 every second of time that I have my eye fixed on this white sheet of note-paper on which I am

scribbling this grumble.

Since writing the "Sun-Glow" letters in 1884-5, from which the foregoing is a quotation, I have made no further study of the Wave Theory of Ether and Light, and have now no clearer grasp than before of the 477,000,000,000,000 of oscillations per second produced in the eye by red, or the 699,000,000,000,000 produced by violet, or the 4,072,000,000,000,000, produced by the combined spectrum, or white. The subject of Light and Heat, as I have said before, is to my mind an utter mystery ; and none the less so with these figures to enlighten me ; and so I am willing to let it remain—Light unenlightened. At the same time I feel sure that some day there will be found to be something wrong about the figures. The Table of Dimensions of Light Waves on page 54, for which Mr Laing is not responsible, gives the respective numbers of oscillations in one second of time of each of the colours of the solar spectrum in rotation ; viz : Red, Orange, Yellow, Green, Blue, Indigo, and Violet ; the two extremes being the quantities I have just quoted ; and the author observes : " But there are waves and vibrations on each side of these limits, which produce different effects, the longer waves with slower oscillations beyond the red, though no longer causing light causing heat, while the shorter and quicker waves beyond the violet cause chemical action, and are the most active agents in photography."

I have no suitable thermometers in reach with which to test the heat of the respective colours of the solar spectrum, or it would be a very easy thing to do. But, contrary to the foregoing, it is on record that when Dr. Herschel tested the heat, and found the red much the hottest of the visible colours, some rays unrevealed by colour, revealed themselves by a still greater heat even than the red, increasing to half an inch beyond the red, then diminishing gradually ; but they were still perceptible an inch and a half beyond the red. This reminds me to say a few words about the solar spectrum. According to Dr. Herschel we have something beyond the red revealing itself in sensific heat, and we really want something there revealing itself in colour also. I am confident there is something more in Light than is shewn by the prism of glass in its spectrum in the dark chamber by its refraction of a beam of light. I have seen those colours mentioned in modern science books as "the seven primary colours." That is a mistake ; as you will prove with your own eyes. We will begin with

the red : We want a more perfect red than the spectrum gives, without any mixture of yellow—a crimson ; and I am sure it is somewhere close by this red, either behind it, or side by side with it ; but unrevealed on the dark background of the dark chamber. There is, we shall find, some yellow mixed with the red as we see it, without which it would be crimson. The pure unmixed red, the yellow, and the blue are the three only primary colours, as we were taught in our school-days ; all the rest of the spectrum being combinations of these three. I shall now make some notes with a prism in my hand, and shall send you another prism that you may follow me in these observations ; for it is sometimes difficult to lay one's hand upon even so simple a thing as an old Chandelier-pendent when most wanted. I am making these observations at my Stoke house, in a room the window of which overlooks a chapel across the road, with its gables and roof-finials. The window being closed, I have, as it were, two reflecting screens before me to observe through the prism ; the first being my window itself with its squares of upright and horizontal bars ; and, through that, the building opposite. An upper bar of the upper window-sash has the sky for a back-ground, and presents a most beautiful appearance, being entirely clothed and hidden in colours. The top edge is a pure blue graduating to indigo, violet, red, orange, and yellow. Across the road, as seen through the clear panes of glass, the ridges and eaves of the roof of the chapel likewise exhibit the blue graduating to violet, and the remainder of the colours are spread out dimly on the tiled roof itself. But the finials, rising into the air, with the sky background, exhibit in a halo radiating from them, a most beautiful complete spectrum thus : blue, indigo, violet, purple, crimson, red, orange, yellow, green ; then blue, indigo, violet again, and then the continuance is lost again in the scattered colours of the roof. Now by means of this double screen I am able to overlap the various colours by shifting my position in the room to right or left, or nearer to or farther from, the window ; with the prism at my eyes ; and so I bring a patch of yellow in the window, radiating from the sash-bar, upon a patch of blue radiating from the roof over the way, and the green is produced ; I bring the same yellow of the window, upon the crimson over the way, and the red is the result ; blue brought upon crimson produces the violet ; and so on. Thus we prove the composition of these secondary

colours by producing them with the mixed primaries of the spectrum itself ; except that we have here the beautiful crimson, which we do not find in the ordinary solar spectrum in the dark chamber. Then we get another interesting result. Below one of the window-bars which I have just described, with the sky back-ground, there is the red, shading off to orange and yellow. I retire farther back into the room, with the prism at my eyes, watching this particular bar as I change the angle of radiance in retiring, and the graduated band of red to yellow changes, and becomes a band of rich crimson at top, and a band of clear yellow beneath it. I return to the old position gradually, still watching, and the change of angle, resulting from my changing position, closes up the dual band again, placing part of the lower yellow band between my eyes and the crimson, gradually covering it up and restoring the graduated red orange and yellow. These bands of colour seem to be placed like the laths of a Venetian blind, which, when placed at a certain angle and looked up at from below, partly overlap each other ; and the same when seen from another position seem detached from each other. And this is why I said the crimson might be behind the red in the solar spectrum in the dark chamber. My object in thus referring to the component colours of light is to shew that we want the crimson at each end of the spectrum, to produce the red at the top, as well as the indigo and violet at the bottom ; and then, after thus overlapping the yellow at one end, and the blue at the other, we should expect its continuation as a primary colour ; and the mystery is how it can be at both ends of the spectrum. That this beautiful clear crimson exists as one of the constituents of light you will find also abundantly proven by looking through the prism at the light among the foliage of trees with a sky ground, and the tracery of lace curtains, also against the sky. And the heavens and the sun itself bear witness that this beautiful crimson is one of the components of light. Behold the sunset of a fine summer eve with its reflecting clouds high up, the promise of a fine summer morrow. The earth's atmosphere becomes the prism through which the rays of the setting sun are refracted, and you get first the yellow, then the deepening orange, to red, and glorious crimson. This is all reflection of refraction ; and if the reflecting clouds be high enough to catch the last lingering refracted rays, they will throw down to your eye the purple, which is

the link between the crimson and the violet. Again those "Sun-Glow" letters come to my mind ; and I presume to think you might be pleased to see the brief series in connection with our present meteorological train of thought, to which we may never return again. Those letters certainly belong to this general review-grumble ; being, unfortunately, like this series, an attempted exposition of some errors of so-called "Modern Science." So, with this presumption in my mind, I will ask permission to condense those five letters into my one next letter to you, and so let them re-appear in this series, to which they seem to belong, before proceeding with the review of "Modern Science and Modern Thought."

For the present, we see that the knowledge that light is composed of this primary trinity of colours solves none of the Mystery of Light, but confirms and intensifies the mystery. The top and bottom of the ordinary solar spectrum each shew the overlapping of crimson, without exhibiting the crimson itself, and the question arises, How are those two opposite ends connected with that one same colour ? We are reminded of the incomprehensible infinities ! Must we think of the circular symbol of Eternity ; and suppose that the spectrum, as we see it, is but part of a circular band of colours ? If the solar spectrum be but part of the edge of a circular band, or hoop, of colours, it would be but a diameter, or third of the whole circle, that we see ; and the colours continuing onward from the top, curving downwards, and onward from the bottom curving upwards, the whole series of the spectrum may be repeated, with the crimson and purple twice repeated, and so accounting for the top and bottom influence of the crimson as we see it in the ordinary spectrum, where it certainly overlaps. This, however, is speculation, with which, and without which, Light remains an unfathomable Mystery—a Divine Mystery—composed of Divine colours, and colour everywhere is a Divine Manifestation, clothing Nature with its beauty and wondrousness, in the flowers, the birds, the gorgeous flies ; and all things animate and inanimate. And all this was divinely so before the lens of the human eye was created to behold it ; or the soul of man was incarnated to enjoy it ; and search into it ; without ever understanding it. For, long before that advanced incarnation in the present human form, the rainbow stretched across the heavens, and the glories of sunset and sunrise glowed in the east and the west, or somewhere, bearing

witness to the crimson constituent of the Divine Mystery—Light ; the Divinity in which all things on the surfaces of all the countless worlds are steeped ; and in which all life lives ; and which, itself, can never die ; even if it shift its chief residence from all the suns and make one universal everlasting Day of SPACE.

LETTER XVIII.

THE GREAT ERUPTION OF KRAKATOA IN 1883, AND THE SUN-GLOWS
OF 1883, 1884, AND 1885.—THE REPORT OF THE ROYAL
SOCIETY ON THE SAME.

18 OCTOBER, 1891



BEG now to send you newspaper-cuttings of my letters on the great Sun-glow period of 1883, which letters appeared in the "Staffordshire Sentinel" during the latter weeks of 1884 and the early weeks of 1885 :

THE “SUN-GLOW.”

To the Editor of the Staffordshire Sentinel.

SIR,—When I saw the letter in your issue of September 12th on the subject of phenomenal sunsets and sun-glows, from the pen of my learned and heroic friend Mr. Clement L. Wragge, I was too much occupied to write my views on the subject, and felt that I must leave it to some other meteorologist to discover and publish the truth about that matter. But the subsequent repetition of these glorious sky-effects reminds and persuades me that I ought to try to clear the air of the volcanic-dust theory, which has been so universally adopted by scientists all over the world. The explanation which I shall offer is the one which I read in the heavens, and expressed to those about me, the very first evening on which I witnessed one of those splendid sun-glows in November, 1883, before the dust-theory was set forth, and I have not since been able to come to any other conclusion. These phenomenal sunsets and glows have appeared all over the world during the past twelve months, so far as we can learn, and I have no doubt that they have appeared in every planet of the solar

system which happens to be endowed with an atmosphere, however composed, for the cause lies entirely with the central source of heat. But, so far as our globe is concerned, and which alone concerns us, it is impossible that any single speck of a volcano-crater could have sent forth during the brief period of the Krakatoa eruption, in addition to its lava and pumice and heavier rocks and subsided dust, sufficient finer floating dust to spread itself through the entire atmospheric envelope of the earth, and in sufficient density to affect and reflect a glorious sunset anywhere and everywhere. Had that discharge been nothing but fine floating dust, it would not have sufficed for the twentieth part of the effects attributed to it. But there was more cindery pumice than dust thrown out of the Krakatoa crater besides the lava, and heavier rocks and sand, and Mr Wragge in the Maranoa sailed for 500 miles through an ocean cinder-path of this pumice off the Straits of Sunda, in November, 1883, on his way to Australia. And mark what a mere pin-hole is any crater in the largest imaginary globe, with its atmospheric envelope, which the mind can possibly conceive or grasp. That sufficiency of dust is the first impossibility. The next is this : Suppose for a moment that Krakatoa, with Mount St. Augustine added, or all the active volcanoes of the earth combined, *could* give forth such a tremendous discharge of dust as to affect all the earth's atmosphere, that dust could not remain long suspended so high up in the light and increasingly lighter air of the upper regions. Natural gravity alone would bring it to the denser lower regions during every period of calm, and thence to the surface of the earth, as the finest matter discharged by rivers settles down in the so much denser ocean. Even the fine particles of oxides resulting from the combustion of the falling stars as they daily dash into our atmospheric envelope, soon sink to the surface of the earth, some alighting on the snow-caps of the mountains, and being thence recoverable for philosophical examination. But there is another agency at work which would rapidly filter the atmosphere of its dust, apart from the natural gravity of the particles themselves, and that is the descent through it from higher regions than these atoms of rock could ever reach, of aqueous clouds which clear the upper air of all dust, including that of the combusted falling stars, and drag it rapidly to the earth with the dews and showers. As a matter of fact, however, the glow-producing Javan dust has not come down yet, because it has never gone up to

produce these glorious effects, which are more fitly composed only of the material of rainbows. All are familiar with the demonstration of the presence of dust by means of a ray of sunshine entering a dark room through a crevice in a door or shutter. Then we see the myriads of lively gilded atoms ascending and descending the Jacob's ladder of light ; but the condition of that room is not the condition of the outer atmosphere, either after a heavy nocturnal fall of dew or a prolonged shower of rain. The fogs of cities, which are merely low-down cloud mists, filter the air even of its smoke, and bring it down to the surface of the earth, to the annoyance of the noses and throats of mankind.

I will, with your permission, endeavour to make clear in another epistle the cause of the phenomenal glorious sunsets and after-glowes of last year, and again of this.

I am, sir, yours, &c.

(Written at Penmaenmawr).

(SECOND LETTER).

To the Editor of the Staffordshire Sentinel.

SIR,—Having said that it was impossible for the Javan Eruption of 1883 to have filled the whole earth's atmosphere with volcanic dust, which should remain floating therein already from autumn to autumn, in spite of the filtering rains of a whole winter and the rains and heavy dews of a hot summer, and to the extent of still tinting the evening skies with gorgeous glows, and still adding abnormal richness to our sunsets,—I will now proceed to explain what I believe to be the actual cause of these glorious effects. But let me first add that it must not be supposed for a moment that atoms of volcanic rock, however minute, can remain suspended in the rarefied upper regions of the air, where the so much lighter molecules of water-vapour cannot ascend to them during a high temperature, to bring them down during a low temperature. And if those upper regions of the air be too cold in the height of summer to permit the molecules of water to ascend, but precipitate them at the upper limit of their reach as particles of frost, then that would indicate such an extreme attenuity of air that through it the finest rock-dust must fall, like a shower of shot, during the first period of calm.

As I am addressing myself to the general reader rather than to the scientist, I shall use rudimentary illustrations, and language as simple as possible. Let us recall to mind the puff from the funnel of a steam-engine. At the immediate mouth of and inside the funnel, and in the boiler, the steam is invisible, being transparent as the air in which it is dissolved by heat; but the moment it becomes encompassed by the cooler outside atmosphere it is precipitated from its solution in the previously hot air, in the form of an opaque cloud prior to becoming a dewy shower, when it occupies a space about 1,650 times less than it did as transparent steam. Invisible vapour of water pervades all the lower atmosphere like that in the boiler and funnel, but in much smaller proportions, variable according to temperature, being pressed upward among and between the elementary atoms of air, by the weight of the atmosphere, according to the law of diffusion. The higher the temperature of the air the greater is its capacity to hold aqueous vapour in invisible suspension, and a reduction of temperature is followed by condensation into mist, corresponding with the steam of the funnel. The invariable colour of pure water is azure, which is shewn whenever several feet depth of it repose upon a pure white floor; and it is the presence of water dissolved in the atmosphere which gives blueness to a clear sky. The more water there is dissolved in the air the deeper is the blue. Contrast the mid-day sky of Italy with that of the Arctics. Another illustration of what I am about to say will be especially intelligible to the mountain tourist. I am writing this at lovely Penmaenmawr, and look from my sitting room window upon an amphitheatre of mountains. I have been held prisoner in this room by weather—not this autumn, but last—when the mountains were not to be seen from summit to base. All from within a few feet of my window was hidden in mist, which was nothing but low-down sheet-cloud, the barometrical record shewing low atmospheric pressure. With nothing but mist to gaze at through that window, I paced the room and watched the aneroid barometer before me for signs of a change, being too holiday-idle to sit down to literary work, and bent on ascending the mountain immediately before me, to visit the vestiges of that grand old sun-temple the Cerrig-y-Druidion. By-and-by the aneroid indicated increasing pressure of atmosphere, and, exactly as the atmosphere became more dense, the cloud-mist slowly rose from the

earth, gradually revealing the trees, and fields, and villas of the lower slopes of the hills. And still the sheet-cloud rose higher as the density of the air increased, being bound to remain in the stratum which could just poise it. And so on as the mercury rose in the ordinary barometer, the cloud, exactly responsive, rose too, until the summits of the mountains were seen. And still the pressure increased and the cloud rose higher, until it changed to heap-clouds, and the sun's rays striking through transformed them into brilliant heaps of celestial fleece piled up against the preponderating blue air, in which some of the misty moisture had at last become dissolved by increased heat and increased pressure combined. Then I ascended the mountain, and visited the intensely interesting desolate places where our sun-worshipping ancestors used to erect their altars to Baal "and sacrificed and burned incense in the high places, and on the hills." I am, &c.

(THIRD LETTER).

To the Editor of the Staffordshire Sentinel.

SIR,—During the latter part of 1883, and the early part of 1884, the sun gave forth unusual streams of heat; and the share which reached the envelope of the earth was far greater than the thermometers indicated. I wish especially to point out that whenever any extra heat reaches our atmosphere from the sun, it is immediately in its passage through the air partly absorbed as *latent* heat, being as such employed in the extra expansion both of the air itself and of the watery vapour which, below the frost-point, always accompanies the air. This increased expansion is, of course, upward, and the extra heat which has become thus latent, and has not affected the thermometers, has actually increased the diameter, or height, or depth, of the earth's envelope of air and watery vapour combined. The uppermost dew-point, or cloud-condensing point, or, perhaps, more correctly still, the upper frost-stratum, is lifted higher from the surface of the earth, and the increase of transparent watery vapour deepens the blue of the sky.

Now, this was the condition of our atmosphere all round the globe during the special sun-glow period; and when the sun declined in the evening sufficiently to reduce the temperature of these abnormal upper regions where this transparent vapour had reached, then it

would begin to condense into fine mist, or water-dust, or even ice-dust, the cooling stratum being pretty level, or calm, and that water or ice-dust would instantly reflect downward the red or orange refracted rays which are always shot up from below the horizon by the setting sun, whether we see them or not. It was the abnormal height of that mist which enabled it to prolong the reflection from the setting sun. And so delicate and perfectly transparent is the intervening azure veil that it offers no impediment to the reflection of these stronger red and golden rays. Only when the reflecting medium was very attenuated and feeble the blue added a slightly purplish hue to the red rays, a sage green to the orange, and greenish turquoise to the yellow. It may be asked, if ice-dust, why did it not immediately descend through the rarefied upper regions where it was formed? Doubtless it did descend. It would descend and re-vaporise as soon as it reached the warmer stratum beneath, but the ice-dust would be forming above just as fast, and so keep the glow going. Everybody will remember how sometimes on a moonlight night drifting clouds approach the moon, looking by its transmitted light like masses of bright opaque fleece, yet these pass over its disc with so little obscuration of its brilliancy that they seem to be passing behind it. So when this upper haze was thin it would be sufficient to reflect the glow without hiding the pale moon or stars, as often happened.

At Aberystwith a few years ago I saw a red glow as splendid as any of these we are discussing. But it was reflected from ordinary level high-up sheet-cloud, like that which I described as ascending from the landscape of Penmaenmawr, leaving all clear beneath it. While the sun was setting, this dense sheet-cloud presented a level leaden tint ; there was no streak nor sign of red nor orange nor blue, nor any expected. But suddenly it seemed as if a million tons of red Bengal lights had taken fire beyond the distant Atlantic horizon, and the heavens became crimson and the ocean glowed, like the sky and the sea of a Pandemonium. This happened during the autumn, when the sun set southward of Ireland, and there was no land between the beholder and the distant Atlantic horizon.

Now that portion of the extra solar heat of the sun-glow period which I said was not registered by the thermometers, because it became latent in air and vapour, was yet, so far as the vapour was concerned, registered in its effects by the barometers. They indicated,

generally, greater pressure during that period, and that greater pressure, being general, must have been entirely due to the extra water dissolved in the air. Just as salt and other dense solubles add to the weight of the water containing them, so water when in a state of elastic vapour in the air adds to the weight of its column. In this latitude the annual mean height of the mercury is about 29.95 inches, reduced to sea-level, and to 32 degrees Fahrenheit, but nearer the Equator, where the air is less dense, the pressure is greater, because the quantity of vapour therein is greater ; while nearer the poles the pressure is less, although the air is denser, because there is less vapour. Yet the north wind brings us greater pressure and the south wind a depression ; just contrary to their natures at home ; because the moment the thirsty north wind reaches these moister regions it adds watery vapour to its aerial density, while the south wind deposits its moisture, and brings us its aerial levity.

The best chance I had of watching a sun-glow was on the 24th December, 1883. I believe there was none recorded by the Royal Meteorological Society for that evening, but over Alsager and neighbourhood it was a splendid sight. I was walking there with two companions, the afternoon being beautifully clear and bright, and the sky an unclouded deep blue. We had been talking about the glows, and I had denounced the Javan-dust theory, pointing to the clearness of the blue. As the sun was setting, with sky still clear, except for a slight streak-cloud over the west, I expressed the opinion that we should presently have a glow. We had, but it was not red, it was golden ; and it was not a thin haze, but so opaque and dense generally that had it been rock-dust no clear blue could have preceded it a few minutes before. In some exceptional places where this gold dust was more thinly developed, it formed a rich greenish turquoise in sending its feeble rays through the blue air. There was no wind blowing, and when the sky-painting began there seemed to be no possible materials at hand, nor time for getting them together, to make up the magnificent transformation scene which was forming with magic rapidity all over the welkin. The golden sky prevailed with increasing intensity, even down to the eastern horizon, and huge bronze-like heap-clouds, edged with brightness, formed beneath the glowing gold, with streaks here and there, like mountains and plains of heaven ; while in the west the painting was still more varied and

gorgeous, and all the clear landscape became faintly gilded with the glow. Yet all these wondrous changes were performed without any visible movement or perceptible operation of any kind. It was magic sky-painting in glorious earnest, and the result was worthy to canopy the evenings of Paradise. But our admiration of this parting gift of Apollo, this rich sky-litter, like the ruins of a thousand rainbows scattered upon a field of gold, was mingled with regret and sadness to know that it must all—with all its divinity—prove more evanescent than the loveliness of terrestrial flowers, and must all be swept away from to-morrow's path of business of the sun, all re-transformed to its original azure vapour. Could all this heavenly magic be the work of terrestrial rock-dust? I am, sir, yours &c.

(FOURTH LETTER).

To the Editor of the Staffordshire Sentinel.

SIR,—Some of your readers are enquiring why the Italian and other warm skies, so charged as they are with watery vapour, do not every winter exhibit the sun-glow. These special glows are no more to be expected during an ordinary Italian or Indian winter than during an English summer. The warmer climate would still require an extra barometric pressure, and extra high-up presence of vapour to reach the higher cold-stratum of precipitation, and become ice-spiculæ, or mist, or water-dust, to produce the extra glow. Some readers again are enquiring why the same glows have not been apparent in every past instance of a period of extra solar heat. The answer to this is still more simple—I do not know. I have seen, many years ago, either at Southport or Rhyl, similar glows on rare occasions at sunset, and I distinctly remember noting that the red reflection began in the east, and gradually extended over the sky westward, because the necessary cold for the condensation of vapour would begin to operate farthest off from the setting sun, and would gradually follow its recession until it hung over the west. But, in the words of Mr. Clement L. Wragge, written in Australia, these "sunsets and sunrises—which, by their wondrous beauty, have astonished both savage and civilised men"—have been continuous and intense beyond all previous experience of the living, or tradition of the past. It has happened so under meteorological combinations which may, perhaps,

never be traced out. Meteorology may be termed a kaleidoscopic science. If the reader be not familiar with the kaleidoscope, let him go at once to any first-class toy-shop, and ask to be shewn one. At every revolution of the tube the bits of coloured glass tumble into new positions and combinations, and by the multiplied reflections in the interior of the instrument they form brilliant rosettes of ever-varying prettiness. Of ten thousand revolutions, with the consequent ten thousand changes of pattern, probably no two results are exactly alike. It is, therefore, impossible to predict a pattern, or to define the exact causes of a result. So it is with meteorology : variations of temperature, light, day and night, land, latitude, ocean, ocean-currents, rivers, lakes, air, aerial-currents, vapour, cloud, water-dust, ice-dust, elasticity, gravity, electricity, and magnetism, are all factors represented by so many pieces of the coloured glass, and which in their varied operations—their actions, reactions, counteractions, and complex jostling together, produce results as varied, as unpredictable, and as inexplicable as do the factors in the kaleidoscope ; although in each case everything that happens is in strict obedience to fixed and well-known laws. It is the complexity and rapidity of action that baffle our grasp. And thus, unwise is he who professes to be weather-wise ! and it is no shame to a meteorologist to say—I do not know. It is this complexity of factors which causes meteorology to appear to the casual observer to be made up of contradictions and inconsistencies. The glows were accompanied with generally gorgeous cloud-effects, in addition to their own special richness, and I take those also to be chiefly the result of high and steady barometrical pressure which caused the clouds to be formed and poised higher up in the air than usual, as I described the uprise of the sheet-cloud at Penmaenmawr, under the influence of increasing air-pressure. For when the clouds are low, the yellow, orange, and red refracted rays of the setting and rising sun pass upward on the other side of them, and the effects are hidden from us.

[The remainder, referring to the blueness of the sky and of water, I have already quoted in Letter XVII].

I have yet a word to say about the “green suns” of the glow period ; about ancient glows ; about cosmic dust, Italian dust, and gold dust ; and if I cannot include all in the next letter I will cut the yarn abruptly and hold my peace after that. I am, sirs, yours &c.

(FIFTH LETTER).

To the Editor of the Staffordshire Sentinel.

SIR,—Remembering that I had written years ago about the colour of water, including the different tints of the ocean, I have searched back among my printed scraps and find the following, published July 7th, 1877. I quote it here because any of your readers who may happen to travel in Devonshire and Cornwall, can go and see for themselves what I have described. After a description of the progress of a rain-storm over Lee Moor in Devonshire, or St. Austell's in Cornwall, I wrote : “This white cloud, then black cloud, is the very azure being distilled from heaven. The miner gathers the rilles as they flow down the mountain side—these melted clouds—and guides them over his beds of broken granite, in which the felspar is decomposed into china-clay, and waits to be washed out from the coarse ingredients. The descended cloud rushes on in a channel provided for it, carrying with it the fine clay like a stream of milk. At length it finds repose in a large clay-tank, and gradually deposits its burden of white clay. After a while we come and look at it, then we know it again ! The fleecy cloud, the storm cloud, the mountain rill, has come out of its disguise and is again lovely azure ; a bit of sky descended to the earth—Cœlus the son of Æther and Dies, reposing on the fair bosom of Terra.”

It is recorded that during the sun-glow period the sun and the moon often appeared of a greenish tint. As I did not witness these phenomena perhaps I ought not to attempt to explain them. But what I have just repeated about the cause of the blue of the sky ought to explain the green suns and moons, of which the normal colour would have been yellow, their brilliancy being dimmed by a veil of haze. Now, this haze being unusually high up, an extra addition of blue intervening between the observer and the yellow disc must have produced this abnormal green, the inevitable result of transparent blue upon yellow. Let the reader regard a sovereign as a miniature yellow sun, and pencil it over with a pale wash of Prussian blue, and he will see for himself. Some reader says, “I wish I had one to try it !” I am heartily sorry for him. If it be asked, why is the sun of the Italian and Indian skies not normally green through the deeper blue of those skies, I reply that the sun’s rays are there more vertical,

and more powerful to overcome the blue. If it be thought that the land should have been drier than it was, had there been so much more moisture in the air than usual for the time of year during the glows, let me say that the air over the land derives its moisture more from the evaporation of the sea than of the land, and thus the great rivers constantly flow from the land to the sea with the surplus.

Now it has been said in favour of the volcanic-dust theory that glows were recorded as accompanying volcanic eruptions in Iceland in 1783, and Sicily in 1831. But it is probable that the earthquakes, or eruptions, arose from the same cause as the glows—the extra barometric pressure of which I have spoken, and increase of temperature. These influences, as well as an abnormal levity of atmosphere, are as likely to be felt in the great volcanic corridors and caverns of the earth's crust, as in coal-pits, but on scales proportionately vaster. Then it has been said that some volcanic dust was found mixed with the snows of Spain and Italy, and the rains of Holland, and it is traced to far distant Java. Why should it not be traced, instead, to the summit and slopes of the so much nearer Vesuvius, carried thence by the wind?

A learned and eloquent supporter of the volcanic-dust theory quotes from Faraday that metallic gold, when minutely divided, required months to subside when suspended in water, and infers that, therefore, the less ponderous volcanic material might remain for months suspended in the air. I do not know from which of Faraday's works the quotation is made, but I am sure there is a mistake somewhere. I cannot conceive that the great and exact chemist himself ever made the mistake; but an error has cropped up somehow. Gold is in its very finest condition of metallic dust the instant of its precipitation from solution in acid, and then it settles down rapidly. It will float by clinging to any light material that may be suspended in the water, such as fibres of wool or cotton; but without such aid its suspension is very brief. Gold-leaf will swim upon water a very considerable time. But that is not dust. And the reason it floats is that there is air between itself—a floating sheet—and the surface of the water, for although it appears very smooth, it is microscopically very uneven. The gold-leaf, however, will sink readily enough through calm air, even in these dense lower regions.

Another dust-theory has been advanced—that of meteoric or

cosmic dust received into our atmosphere from outer space—the minute kindred of the falling stars. As to a possible source of supply in sufficient quantity, this theory would have been far more acceptable than that of the Krakatoa crater, because we know little of cosmic dust, and there might possibly be enough in the earth's future path at any time to envelope it in total darkness, though never to encompass it with glory. That we have not passed through it, however, we know, because it has not showered down upon us in sufficient quantity to prove its presence. It was objected that such dust would have been consumed by the heat arising from its impact with our atmosphere. But if it be any comfort to the inventor of the theory let me assure him that such would not have been the case. Any cosmic dust so light as to float about at leisure in the rare air of the upper regions, if that were possible, could never ignite by impact with that air, like a rushing meteorite of a ton or even an ounce, entering it at the very maximum speed of its race of ten or twenty thousand miles towards our planet. And as to being consumed, these celestial projectiles, although found to be composed of twenty-four of our terrestrial elements, are chiefly metallic iron, which by ignition is not consumed but merely oxidised. Nor is this theory of the descent of meteoric dust so extravagant as an accepted theory of the origin of its bigger kindred—the falling stars. It is thought that these meteoric bodies, which are constantly bombarding all the empires of the earth, and, more than any other, Britain and Ireland's empire of the land and the ocean, and whose numbers are variously estimated at from 24 per day to 10,000,000 per day, ranging in weight from several tons to a few grains, are merely our own old shot returned to us; actually the same native iron projectiles with which the earth once assailed the cosmos all round, her volcanoes being her powerful guns. And that time must have been awfully long ago, even earlier than the infancy of the Granite Age, before the earth's iron became oxidised; for these projectiles are largely composed of metallic iron, while the iron of the granite is in a state of protoxide, and the peroxidation period came later on with a more highly oxygenized atmosphere. Let us imagine a discharge upwards of a shower of this iron in pieces varying from four tons down to the lightness of dust; and some of these meteorites have fallen far heavier than four tons. To get out of the range of the earth's attraction, so that it shall not

fall back, it is admitted that this discharge must have an initial or starting velocity of not less than 360 miles per minute. And when it had been shot a distance of 12,000 miles the four-ton piece would still have a weight, or pull towards the earth, of about 5 cwt. ; yet so tremendous was the explosion that even at that distance, and with that pull backward, it is vigorous still in its upward flight, and presses on through space until there is not left a grain of attraction to its parent earth. Then it idly rests in space, like a sleeping, floating, black duck, moving only with the general astral movement until in the course of thousands and thousands of years its parent earth happens to be travelling that way, when the rejected one arouses and rushes back to the old bosom, and is now actually reposing in the British Museum, having lost weight by combustion during the last journey through the air to the extent of nearly half a ton. It is there, certainly ; but there is a mistake about its paternity. It may be said that such a storm of iron as this, and such velocity, and such distances, are as nothing in the infinite affairs of the cosmos. So are terrestrial mountains as nothing, especially hollow volcanoes. The idea of the removal of mountains is not new to the human imagination. There is that venerably ancient and highly authentic record of the Giants, who, when they sought to avenge the defeat of their cousins the Titans, thought to take Jupiter and his heaven by assault, and piled Mount Ossa upon Mouut Pelion to scale the celestial walls. And when Jupiter was again victorious by the aid of his son Hercules, did he not lift up several mountains, and use them as crushing extinguishers upon the bodies of the prostrate rebels ? Depend upon it no hollow mountain of the earth could contain such a blast as would do the work we have spoken of, without being lifted from its foundations and scattered abroad in fragments like a bursted gun. The theory is an unfit and needless paragraph in the imaginary early history of the earth.

But, however reasonable it may be that the earth should some day find itself travelling in regions crowded with this metallic cosmic dust, we shall know it well enough if it happen, not by the deep blue sky of the glow period, nor by the "sunsets and sunrises which by their wondrous beauty have astonished both savage and civilised men" as Mr Wragge writes from among the savage and civilised of Australia : but whenever a mass of black cosmic dust shall form a

veil between the sun and the earth anywhere within the space of the 93,000,000 of miles which separate them, we shall know it with awe and terror. For it will render the deep blue invisible and shut out from us the light of the sun and moon ; and, consequently all refractions and reflections of rays which make the mornings and evenings so glorious ; and will give us instead, black darkness and cold desolation.

With grateful thanks for the valuable space accorded to these letters, which though aqueous throughout in subject, have been as dry as the dust which they have sought to lay with the watercarts of the sky, I am, sir, yours &c.

On January 17th, 1884, the Council of the Royal Society appointed a committee "to collect the various accounts of the volcanic eruption at Krakatoa, and attendant phenomena, in such form as shall best provide for their preservation, and promote their usefulness." The committee ultimately consisted of thirteen of the most eminent British Meteorologists, Mr. G. J. Symons F.R.S. being chairman. They started with the fiat of the Royal Society, that the structure was all to be erected on the Dust theory ; that the extra meteorological glories under their consideration were phenomena "attendant" on the eruption at Krakatoa. In the spring of 1887 the M.S. record of the results of the labours of the committee was completed, and in 1888 the same was published in a royal quarto volume of over 500 pages, entitled "The Eruption of Krakatoa and Subsequent Phenomena," my copy of which is now before me. It is an interesting and valuable book of reference. But it does not contain a particle of evidence that the Krakatoa eruption of August 26th and 27th, 1883, had anything whatever to do with the meteorological glories which commenced later on and continued, intermittently, until December 1885. But the same is assumed throughout the book. The value of the book reminds one of the old alchymists who while they vainly sought for the secret of making gold, made, or discovered, the rudimentary science of chemistry.

To me it is a matter of astonishment that the great minds constituting the Royal Society could ever have been brought to the conclusion that the true explanation of those wondrous manifestations of the component colours of divine light was volcanic dust ; not

water-dust, nor ice-dust, nor gold-dust ; but common dirt—dust-bin dust ; maintaining itself like something ethereal in the heavens through all the seasons of the years from August 1883 until December 1885.

[P.S.—In Letter XVII where mention is made of the solar spectrum, I believe I misunderstood a quotation from “Modern Science and Modern Thought” referring to the continuation of non-sensific light beyond the red, revealed only by its so-called wave effects. The passage is this, speaking of the visible spectrum : “But there are waves and vibrations on each side of these limits, which produce different effects, the longer waves with slower oscillations beyond the red, though no longer causing light causing heat, while the shorter and quicker waves beyond the violet cause chemical action, and are the most active agents in photography.” When dwelling upon this passage I read it as meaning : “no longer causing light—the light causing heat” and refer to it in that sense. But on reading it again I believe its meaning to be “no longer causing light, *yet* causing heat,” and that leaves nothing to correct. This mis-reading of mine does not affect the context.]

LETTER XIX.

GOLD AND THE PRIMARY COLOURS OF LIGHT.—ERRONEOUS CONCLUSIONS ON “CONSERVATION OF ENERGY.”—THE ENERGY OF THE COMBUSTION OF COAL EXPLAINED.—THE WONDERFUL AFFINITIES BETWEEN OXYGEN AND CARBON.—THE DISSOLUTION OF SILICA BY LEAD AND OXYGEN.—AN ELOPEMENT FROM THE CRUCIBLE.—“CONSERVATION OF ENERGY” IS IN AND FROM THE SUN ONLY.—FALSELY CALLED SILICATES OF POTASS AND ALUMINA.—IMMEDIATE CONSEQUENCES OF THE SUN EXTINGUISHED.—ON COSMIC ANNIHILATION.

25 OCTOBER, 1891.

IN our last notice of “Modern Science and Modern Thought” I dwelt upon the colour-constituents of Light. It is a rather curious circumstance, perhaps not worth more than mere passing observation, that gold seems likewise to be composed of crimson, blue, and yellow,

the primary colours of light, in some sort of manner. The yellow by reflected light is familiar enough. When the metal is beaten out into very thin leaf, and held up to a strong light, we get a green tint by transmission of the light ; which is a mixture of the yellow and blue. When we burn it we get a crimson mist ; and as a ceramic enamel it is purple, a mixture of crimson and blue. In making preparations for the colouring base of this purple enamel, I have often had before me a large white bowl of purple solution of gold, which has suddenly changed to a green solution, and presently, by the mere influence of light, to the yellow metallic precipitate.

I have now read on to page 70 of the book, passing without note some passages that are rather misty, or rather dusty, or my task would never be finished. One of these passages, however, I now pause at, on the page named. The question under consideration is the "Conservation of Energy," and this is the paragraph : "If we wish to carry our inquiry a step further back and ask where the original energy came from which has undergone these transformations, the answer must be, mainly from the sun."

Yes, so mainly from the sun that all other put together could not prevent the death of our present physical solar system, with the death of the sun. Then :

"The sun's rays, acting on the chlorophyl or green matter of the plants of the coal era, tore asunder the atoms of carbon and oxygen which formed the carbonic acid in the atmosphere, and locked up a store of energy in the form of carbon in the coal which is burned to produce the steam."

This is hardly clear ; or hardly correct. The carbon is *not* compressed stored-up energy in itself, to be made active energy of itself. It is an instrument in the development of the energy which is latent, not in the carbon, but in the heat of gaseousness of the oxygen of the atmosphere in which the combustion takes place ; not ancient carboniferous heat, but heat just arrived from the sun, and transmitted thence about eight minutes and eighteen seconds ago perhaps ; not when the coal-fields were originally laid down, or the chlorophyl of the plants was living. So far from the solid carbon of the coal being the restorer of old energy in its combustion, it is a great absorber of new energy, in the process of its return to gaseousness ; and takes back from recent sun-energy that share of latent heat which it parted

with, instead of conserving it, in its chlorophyl days ; thereby then adding to the warmth of the climate of the Carboniferous forests ; which warmth darted off into cold space and was by no means conserved. No, the carbon entirely gave up its ghost—its energy—when it gave up its final oxygen and became dead chlorophyl in coal. And its daily resurrection with us is by means of new *external* energy, or heat, or fresh life absorbed from the sun, in the operation of changing the old solid dead carbon to new carbonic acid gas, for the creation of fresh chlorophyl in new living plants. And in the combustion of the coal the sensific heat is not given out by the coal ; nor by any of its kindred constituents ; but it is given out through the chemical affinity of the liberated hydrogen of the coal for the oxygen of the atmosphere—another portion of oxygen besides that which the carbon has combined with, and the two combining form water, as I once before explained. And it is the reduction of the oxygen from a gas to a liquid which gives us its latent heat of gaseity as sensific heat, over and above what is needed in the still latent state to keep the carbon gaseous. The subject is rather intricate and I fear my sentences are hardly lucid ; so I will try again :

We first start the chemical action by applying new *external* energy — “lighting the fire.” By this we separate the particles of carbon, and the heated expanded oxygen gas of the air acts upon them as an acid, and dissolves them into itself, producing carbonic acid gas. In doing this the oxygen parts with its heat of expansion, derived externally from the lighting of the fire, and it becomes the latent heat of the carbon gas. Some of the particles of carbon thus separated from each other by the heat, escape dissolution in the oxygen, and ascend as smoke, to be precipitated as soot. Exactly simultaneously with this disposal of the carbon, the solid hydrogen also is expanded by the external heat, and another portion of the oxygen of the air, also expanded by the applied heat, attacks that hydrogen ; and the two in their chemical union become watery vapour. In this process the oxygen parts with its heat and light of gaseousness, which we see and feel, and much more than we see and feel ; for it keeps up the supply of heat necessary for the formation of the carbonic acid gas simultaneously with its own formation of water ; which heat was first artificially supplied in the lighting of the fire. To shew that the energy is all derived from the air of the moment, and not from the

coal, you have only to stop the access of air to the fire and it will immediately go out, and the same with a candle or lamp.

It will be more readily understood how so much heat and light are evolved in the union of the oxygen and hydrogen when I mention that the combustion of a pint of oil in a lamp yields more than a pint of water—newly created water—sent forth in vapour ; and of that water eight parts by weight are oxygen liquefied from gas, to one part of hydrogen liquefied from solid coal. Thus we get enough heat and light to render the solid carbon gaseous, and the sold hydrogen liquid, and leave sensific brilliancy and heat besides ; the weight of the oxygen which has become liquid being so much greater than the weight of the carbon of the oil which has become gaseous. The dual affinities between oxygen and hydrogen, and between oxygen and carbon, when expanded by heat, are wonderful ; especially the latter. Not only is oxygen ever ready to snatch into itself carbon vapour, and the carbon vapour to yield itself, but so intense is the love of the latter for oxygen, that, in its turn, it will raise it from the dead to wed it. We have just seen how the oxygen raises the dead carbon of coal to new life and elasticity. So likewise will the carbon restore oxygen from solid death by its mere touch, with the aid of external energy, or heat. This may interest you, as it is not theory, but is, a part of it, chemistry beyond the books ; and, consequently, beyond some of the teachers. It comes about in my preparation of the enamels with which my porcelain is decorated. Those enamels, as you know, are fired on to the glaze, and there become glassy or vitreous, and fixed, by means of fluxes with which the colours are mixed. It is in making these fluxes that I watch the behaviour of carbon and oxygen. I will take the simplest of the fluxes, which is composed merely of red-lead and ground flint. The flint I have previously described to you. It is silica. The red-lead is a combination of metallic lead and oxygen—oxide of lead, and being the peroxide it will combine with no more oxygen in the usual way of oxidation. But when subjected to a certain heat in a furnace with access of air, *it will absorb more oxygen from the hot air* ; so much more oxygen that it becomes a solvent acid, and actually dissolves the metal, and, in combination with it becomes a clear liquid glass. And while it is thus liquid with heat, it has a still further active solvent power, and actually dissolves the flint which is mixed with

the red-lead in the crucible. The flint, we must remember, already contains oxygen, being itself an oxide of silicon ; so that its own oxygen aids the oxygen of the lead to dissolve the silicon. But no heat known to us will enable the oxygen in flint to dissolve its silicon without re-enforcement. When this liquid glass is supposed to be perfectly clear, and is poured out of the crucible, it, of course, cools into a solid glass, and the oxygen there is surely stone dead ; and the transparency there is all due to the congealed oxygen, just as the transparency of ice is due to the same thing. For ice, as you know, is composed of eight parts of oxygen to one part of hydrogen by weight, so that it is all oxygen except one ninth. Well, now let us witness the resurrection from this stony glassy death. If I find that I have poured out the flux a little too soon, and some of the particles of flint are not completely dissolved by the glass-of-lead, I break it up and replace it in the reverberatory furnace, in a crucible, and it melts again, and completes the dissolution of the flint. And now, for experiment, I throw a piece of coal into the crucible ; and it floats upon the surface of the flux like a piece of cork ; the liquid glass-of-lead being so much heavier than the coal. And the coal rapidly burns on the fiery surface, and as it burns it catches up the liquid oxygen of the molten glass ; and they both expand and fly away together up the chimney, as alive and as elastic as ever, in wedded carbonic acid gas. How do I know that this has taken place ? Because I draw out the crucible of remolten glass, and there at the bottom is a bright button of metallic lead, which has been completely de-oxidized by the coal, and is rejected and forsaken, and looks indeed, itself, like a big heavy glistening tear of jiltedness ; and the two erst dead solids—the carbon of the coal and the oxygen of the glass, have eloped together up the chimney, as alive and as elastic as ever, in wedded carbonic acid gas. But all this is rendered possible only by the heat of my furnace—energy extracted from the atmospheric air ; energy renewed from moment to moment by and directly from the sun ; not by any “conservation of energy” anywhere but in the sun itself.

Now the Professor of Chemistry teaches that it is the flint or silica in all ceramic bodies which acts as the acid ; and tells his students that felspar, and my porcelain, are “silicates of potash and alumina.” The truth is this : The potash in the porcelain takes the place of the

super-oxidized lead which dissolved the flint in the crucible. And the potash, like the glass-of-lead, is a combination of oxygen and another metal—potassium. In the porcelain the potash is so scantily present as to only partially dissolve the silica and alumina ; hence the only partial translucency. The harder it is fired, and, therefore, the longer the potash is allowed to operate upon the silica and alumina in its igneous semi-liquidity, the more it dissolves ; and the more translucent is the porcelain. But if I were to apply more heat than I do, the articles would melt altogether and collapse. It is a curious mistake in chemistry to call felspar and porcelain “silicates of alumina and potash,” as though the silica acted as the acid to fuse the alumina and potash ; when it is the potash alone that dissolves the silica and the alumina, in union with the oxygen of those two oxides.

After all, I have said very little on the subject of the combustion of coal ; and of oil derived from coal ; leaving much unsaid ; there being other affinities and divorces besides those which I have referred to ; and there is *mystery* besides ; on which I can throw no light. But I trust I have said enough to shew that there is no latent heat of the Carboniferous Period left conserved in coal ; and that the solid flux and the coal might have lain together cheek by jowl, dead and disunited for ever, but for the heat of my reverberatory furnace ; or some other such application of fresh external energy ; just imported from the sun to arouse and unite them.

And having shewn that the coal is not truly a “Conservation of Energy” in itself and of itself ; but only a means of chemically setting in operation energy constantly renewed by, and direct from, the sun ; which energy is constantly passing away from the earth by diffusion in space ; other thoughts on the subject naturally arise. It is curious that the escape and diffusion of heat into space from the earth, is, in the average of about three months, and in the long run, just equal to the sun’s supply. How can we tell that ? It is a very simple fact and not theory. If the heat supplied from the sun to the earth—the supply being, as it is, incessant—did not steadily pass from the earth into space at the exact rate of supply, but more slowly, the accumulation in the earth would, in a short time, burn all life to death. And, on the other hand, if the heat passed away from the earth at a rate quicker than the rate of supply from the sun, the difference would, in a very short time, freeze all life to death. So you see there

is no such thing as Conservation of Energy in this planet. Of course we have a certain range of variation of temperature, extra warm when the sun gives us more heat than the earth parts with *day by day*, and extra cold when the sun gives us less heat than the earth parts with day by day. But that range of variation is so trifling that the sensitive and easily destroyed animal and vegetable life of the globe remains undestroyed from the beginning, by either of the extremes of heat and cold. This fact of the survival of life, alone, is all the evidence that is needed of the wonderful adjustment of give-and-take in the matter. And, as there is no conservation of heat, of any importance, if the sun were suddenly extinguished we should be aware of the fact in eight minutes and eighteen seconds after the event, and we should begin to shiver immediately, and there soon would be a deluge of rain, quickly followed by universal ice. The solar heat temporarily absorbed in the rind of the earth, which mitigates the severity of November and December, would have little effect with the sun extinguished ; as it would be so much more rapidly radiated into the external cold than during those months when the earth was still incessantly bathed with the daily supply of sunshine. There would be no Conservation of Energy or Heat to save life for a single week.

And now it will be more clearly seen that the theory that Coal is a part of a system of "Conservation of Energy" is not scientific ; because it arises from a want of science—or knowledge. But Mr. Laing is not responsible for that. He is making use of the only authorized materials in his reach, and these materials are all *warranted* by the several highest authorities who have charge of them.

I hope the next section will be somewhat more interesting. In it I may find an opportunity of referring to pseudo-Saladin's pamphlet entitled "Hell : Where is it ?" which you kindly sent me to look at.

Meanwhile let me thank you for your last kind favour and say that you are right in supposing that my evenings alone with my dear friend from Brisbane have been very refreshing. He is one of the true nobles of our race. Being an astronomer he could not shut his eyes to an apparent fact which Dr. Huggins referred to in his Address at Cardiff, saying that even if the collision of "dark suns" produced nebulae, "only such ebbings and flowings of stellar life can delay, even for a little, the inevitable end to which evolution in its apparently uncompensated progress is carrying us."

"Is ultimate annihilation possible?" exclaimed my friend, referring to the death of suns as well as all created things that come within our knowledge—"the thought is too awful!" To which I replied that his own knowledge of the wonderful Wisdom, Beneficence and Power exhibited in all the Creation which he had been enabled to examine, ought to supply the answer. For he is a deeply learned naturalist in the widest sense of the word. And, I continued, he must remember how that with all the death there was a constant succession of increasing higher life; and from decay there was always a progressive resurrection or re-construction. That if suns die as well as men, it must be only because they have both done their part, *or present work*, as living suns, and incarnate men, in the general progress to something higher and better. That as the light of the one was certainly indestructible, we might take it for granted that the soul of the dying man is as indestructible as the light of the dying sun; or else for what purpose had he been created at all, and passed through all his earthly sorrows? For man seemed to be the highest and chief of all the things for which the sun itself was in living operation; supposing the other planets to be similarly peopled. Then I asked, Can you conceive the wonderful universe and its various inhabitants to have been called into existence by such Almighty Power and Wisdom, with so many evidences of Beneficence, for the sake of ultimate annihilation? What foolish waste that would seem to be! The study of the progress of the creation of the earth shews progress to succeed all death. Does it not seem reasonable to suppose that the whole is a system of progress from something lower and worse, to something higher and better?—a restoration from some great incomprehensible fall which requires progressive preparation for ultimate complete deliverance? Then I said "*Mors janua*"—and he added "*vita!* and I believe it!" "Depend upon it" I said "Death is the Gate of Life indeed to those who have availed themselves of their opportunities, in the progressive march of this life's journey. And perhaps those who have not done so, and there are many unreformed wicked people, may mercifully be "born again" to go again through the toil and trial of life's education and life's progress to that Gate of the higher Life. Some seem to need little of this trial and probation and education by means of human life, even those young children who are proverbially pronounced by old nurses to be 'too good and

beautiful for this world ;' and, behold, they take wing early and happily ; and 'of such is the kingdom of Heaven.' This is sometimes the manner in which hardened sceptic parents get a sure and firm faith in the future life. They follow the little angel with their weeping gaze, and so discover the gate of their own future home."

This interpretation of being "born again" seemed to strike my friend and he exclaimed "Re-incarnate?" And I replied "Yes ; mercifully ; instead of going to everlasting punishment." He has a pretty good notion of some folks needing to be "born again" for he has travelled nearly all over the world and seen much of men and manners. And he came to me almost straight from the French Penal Settlement of New Caledonia ; where he had called on a Government mission ; and told me dreadful tales of the devilisms of the convicts. And he knows all about Buddha The Enlightened, having lived with Buddhists during his travels—Buddha, who seems to have been almost as Christ-like in his Divine Compassion, as Christ Himself. And we talked about him, and denounced his priests who have falsified his Compassionate religion, and made him a begging idol—an image with his hand ever open to receive gifts for his idle priests ; his followers being taught, as in other so-called religions, that all who pray must also *pay*. I have a Buddha from Burmah, another from China, one from India, and others besides, and they have each of them the open hand of the Beggar ; so different to the original who gave up crown and kingdom and wealth—all, that he might lovingly help the poor and sorrowful.

After talking about Buddha and Brahma we came to the conclusion that there was no sign that the evolution of progress of life shewed absorption of individuality, or reduction of individuality ; as that was everywhere on the increase so far as our observation could reach. We talked for hours of many things to the point, which cannot be expressed in a letter ; concluding at last that all visible Creation was a beneficently provided path of return from some great fall—for there is no denying natural human devilism—a merciful and powerful arrangement sufficient for the beneficent purpose ; and ultimately changeable in what we call death ; because no longer needed after the accomplishment of that purpose. A path of return ; of uphill toil and sorrow, which we all know by experience ; yet a path strewn with blessings and edged with beauty and comforts and rest

and music and joys after all ; but with sorrow paramount ; and *certain* disappointment to those who regard the path of progress as the *Haven* itself and the End ; and not the mere path of the journey to better things still. When we parted that night my dear friend said, "I am very glad we have had this talk, and quite agree with all you have advanced."

I ought to have mentioned among the strewn blessings of the Path of Progress edged with beauty and comforts and rest and music and joys, our reference to the joys of friendships and family : that man and woman could not be the authors of their own emotions and instincts ; but that they were created in them by the same Fatherly Beneficence which had provided all the rest ; and hence the family reciprocal joys of husband and wife ; father and mother ; son and daughter ; brother and sister ; and all loving friendships productive of so much joy on the journey of life ; *all given in* by the Fatherly Beneficence. For although they are made the means of loving preservation and multiplication in obedience to the command "Be fruitful, and multiply," that command might have been enforced without the addition of all the boons and blessings of life-long enduring family joys. Shall all this display of Fatherly Love, and infinite Power and Wisdom, have been exercised, and a universe so vast have been called into existence, that the end of all might be annihilation ? When we pass from this life we may have done with heat and light in its present sensific form : and when the work of Restoration is completed, all flesh may have finally done with all present sensific heat and sensific light. But the light and heat in other forms remain ; the destruction of which we cannot conceive ; which may be the light and heat of eternity, dispersed for us through infinite space ; the space of our liberty and the light and heat of our future life and joys. Annihilation ! all points to the Resurrection and *the* Life.

How strange it is that some should see in all creation only a vast scheme of annihilation ; while to others it is clearly only and altogether a vast and wondrous active scheme of Salvation. Surely with our positive experiences of Beneficence, the latter view is the most reasonable. And how is it possible that the work of an *Almighty* Creator, with *immortal* materials, which only undergo changes of recombinations, *which changes themselves constitute life*, can ever be annihilated ? The eternal movement of eternal Light and Heat

throughout space, is itself cosmic eternal life. The "some" will say, perhaps, that the whole is an uncreated creation—the illogical thought is about as reasonable as the annihilation thought, I think—and that it is all the work of Nature; and that Nature cannot help doing it; and cannot help herself; and does it all fast asleep by mere self-acting Law. Then it is this *Law* that we call God; or the *Power* of God. Law is not Law without Power; and that Power in Nature is the Supreme, the Almighty Artificer. The makers of the Grecian Mythology, or, perhaps, originally Egyptian, thought of these things; and they seem to have thought it beneath the dignity of the Almighty to be the Artificer even of his own thunder-bolts of Power; and they made Vulcan his Artificer in these things as we make Nature—but Vulcan was his own son, the son of Jupiter Tonans. We are among the Infinities! Let us be very humble.

LETTER XX.

THEISM : PANTHEISM : AND AGNOSTICISM.—A TRINITY OF TRUTH.—
"HELL: WHERE IS IT?" BY SALADIN.—A FALSE SALADIN.—
HIDEOUS BLASPHEMY AND A NOBLE PERORATION.—ATHEISM
AND THE PRIESTHOOD.—THE RELIGION OF LIBERTY, LOVE,
EQUALITY, AND UTTER UNSELFISHNESS.—THE TRUE HERAKLES
OF HUMANITY.—COME GENTLE DEATH!—THE FRENCH REVO-
LUTION.—THE GENERAL CHRISTIAN BOND OF DIVINE CHARITY.
—CATHOLICS, ANGLICANS AND QUAKERS.

9 NOVEMBER, 1891.



E now come to a more interesting part of the book. On page 70 the author enquires :

"But where did the energy come from which the sun has been pouring forth for countless ages in the form of light and heat, and of which our earth only intercepts the minutest portion? This is a mystery not yet completely solved, but one real cause we can see, which has certainly operated and perhaps been the only one, viz., the mechanical energy of the condensation by gravity of the atoms which originally formed the nebulous matter out

of which the sun was made. If we ask how came the atoms into existence endowed with this marvellous energy, we have reached the furthest bounds of human knowledge, and can only reply in the words of the poet : ‘Behind the veil, behind the veil.’”

This “one real cause” I trust I have shewn to be unscientific ; and that it therefore cannot be the one “which has certainly operated and perhaps been the only one.” He proceeds :

“We can only form metaphysical conceptions, or I might rather call them the vaguest guesses. One is, that they were created and endowed with their elementary properties by an all-wise and all-powerful Creator. This is Theism.

“Another, that thought is the only reality, and that all the phenomena of the universe are thoughts or ideas of one universal, all-pervading Mind. This is Pantheism.

“Or again, we may frankly acknowledge that the real essence and origin of things are ‘behind the veil,’ and not knowable or even conceivable by any faculties with which the human mind is endowed in its present state of existence. This is Agnosticism.

“There is one other conception, of which we may certainly say that it is not true—that is Atheism. No one with the least knowledge of science can maintain that it can ever be demonstrated that everything in the universe exists of itself and never had a Creator.”

Let us at this time glance at Theism, Pantheism, Agnosticism, and Atheism only within the limited meanings assigned to them in the words of the above quotation. Then it seems to me at once that Atheism is synonymous with Pantheism, but that you will get at the whole truth if you will drop the word Atheism and blend Theism, Pantheism, and Agnosticism, as here defined, altogether, into one harmonious whole ; and declare that they are not three 'isms but one 'ism. For you cannot conceive the universal all-pervading Mind, with its accompanying universal order and connection as we see it, and its necessary Almighty Creative and Sustaining Power, from the macrocosm to the microcosm, without admitting the Theos as that Power ; or Power of Law. And it is equally true that “the essence and origin” of this wondrous Theistic, Pantheistic, macrocosmic to microcosmic Universe, is “not knowable or even conceivable by any faculties with which the human mind is endowed in its present state of existence.”

As to the "Thought" and "Mind" of Pantheism, if it be not Theos what can it be? If we except Theos, we believe, and have every reason to believe, that man is the greatest, the highest, the deepest of all thinkers known to us ; and possesses the largest share of the all-pervading Mind. And what creative or sustaining universal power is there accompanying human thought? What greatest self-made emperor, and what greatest philosophic thinker, could ever "by taking thought add one cubit to his stature?" or "make one hair white or black," at will? This greatest of thinkers cannot even help himself, much less help to sustain the universe! and the infinite universe as a mere Republic of Atoms is inconceivable. It will not do. You must add the Theism to the Pantheism, and still admit that God in His all-pervading universality is "not knowable or even conceivable" to the human mind, although He must Be. Mix the three propositions as you mix the three primary colours of the spectrum, and you mix them into divine white Light.

Mr Laing in his words "we may frankly acknowledge," seems to be leaning to the Agnosticism which he defines. But he continues :

"Let us return to the solid ground of fact, on which alone the human mind can stand firmly, and like Antæus gather fresh vigour every time it touches it for further efforts to enlarge the boundaries of knowledge and extend the domain of Cosmos over Chaos."

This sounds anti-Agnostic, and more hopeful. For certainly 'Agnosticism without Theism would reverse the last words and leave Cosmos to Chaos. Did I speak of it as a Republic of Atoms? It is not nearly so orderly an idea as that. It is short of all the republican Government and its President. It would be a positive Anarchy, a universal self-rule of Atoms—surely Chaos!

This reminds me of a so-called Agnosticism which can by no means form any part of our divine white light : and that is the so-called Agnosticism which breathes with horrid and deadly breath in the pamphlet which you kindly sent me to look at ; and which I now beg to return with thanks. I am not at all shocked at its title—"Hell : Where is it?" having raised the same question myself. The title-page says it is "By Saladin," a self-styled, but pseudo, Saladin. His is a very nasty Agnosticism ; neither crimson, yellow, nor blue ; nor any combination of them.

This "Saladin" in his "Hell" is doubtless a clever man ;

but so is he altogether graceless ; ungentlemanly ; foolish ; savage ; scurrilous ; and unscrupulous. He is excessively rude—vulgar is too good a word—and very dexterous at mud-throwing. He adopts publicly-abusive antagonism without provocation. He picks a public, altogether one-sided, quarrel, if quarrel it may be called ; with an Archbishop who has done him no wrong, and given him no offence beyond being an Archbishop ; and he trusts to a sort of street-brawling to annoy a distinguished passing gentleman, and set a vulgar ignorant crowd against him. His attacks might be called brutal, only there is no such brutality among brutes, except human Brutes who stab Julius Cæsars. He is like the stoat pursuing a rabbit ; not because the rabbit has done him any wrong, but because the stoat is a stoat. He is no Saladin. That assumption is a part of his egregious conceit and bombast. But Pompey does not always mean Pompey. This writer is, as you say, “shocking !” One may express one’s objections to a Hell of Eternal Punishments, without necessarily becoming a blackguard. There is not a grain of anything Saladin-like or chivalrous, in all this pamphlet of very low abuse. Such mud-throwing bullyism cannot be too severely denounced ; as it is a practice which very dirty blackguards can adopt to the discomfiture of clean people passing by ; without *adding* to their own filthiness. Yet he exhibits learning which ought to belong only to a gentleman, however humble in occupation or in honest social position that gentleman might be ; but, instead, his manners are of the coarsest. We are a bit out of temper it seems. Let us smile in the midst of it. I have met with hundreds of gentlemen in humble life, and have a greater admiration for them than for their more fortunate brethren. This reminds me that I was once in conversation with a chimney-sweep and he stated something which seemed to me incredible ; which he perceiving, he immediately banished my doubts with the remark : “It is quite true, Mr Goss ; for me and another gentleman *see’d* it.” Of course that was quite sufficient. Saladin has been in search of Hell, and because he has not “*see’d*” it, says it is nowhere. I hope he is right, but he is not logical. I hold that a chimney-sweep may very well be a gentleman, and that he may see wonders in company with “another gentleman” of equally humble degree. But if he be a gentleman he will not rub against his neighbours ; nor throw his soot at them. This, Saladin does ; and with a vengeance. While designating the Archbishop a

"clerical cuttlefish" he himself immediately acts the cuttlefish that he may drag in a hideous joke. He says no Hell has been discovered by the telescope, and therefore it must be, if it be at all, beyond the range of telescopes ; and therefore so far away that it would take billions of years to reach it. And then he jokes about "a sinner in search of Hell." You and I do not believe in a Hell of lasting fiery torments ; but, if we did, we might assign it a locality anywhere without the use of a telescope. It might be the sun or moon, or *any* of the stars or planets, and the rate of travel of the "soul that sinneth" *might* be the same as that of light, or even of thought, for aught logic could tell. He bases other jokes on equally airy nothings, or brings them in in the midst of cuttlefish muddle. And when he claims that his own pen "knocks the bottom out of your bottomless pit" he is hardly so clever as he seems to think ; seeing that he leaves it still a bottomless pit. But I am afraid Infinite Space must prove a bottomless pit, which his clever pen will hardly be able to knock a bottom *into*.

This following passage will, I think, shew that I have not been at all reckless in the selection of the adjectives applied to this false Saladin : "If it had been said to Christ, when in Galilee, 'Go to Hell !' and he had obeyed the mandate, he would have given his bridle reins a shake and *Henglered* off to the Valley of Gehenna, 'riding on an ass and a colt the foal of an ass'—a foot on the back of each. Your Grace can, any day, for a few pounds, purchase one of Cook's tourist tickets and go to Hell, as Christ understood the term ; and perhaps the best thing you could do would be to go there and stay there." He writes this, and publishes it, because he thinks it clever. But I do not. Nor this : "If your Lord had such a tough time of it for three days with the worm and the kettle, he will not thank your Grace for explaining the whole thing away. With him it will be just the one thing that cannot be explained away, even if he should forget Gethsemane and Judas Iscariot, and even your Grace." Nor do I recognise the cleverness of this : "Some eighteen hundred years ago you had the misfortune to have a dead god—a god killed with a hammer and four tenpenny nails, and your church has been in a terrible quandary as to where to put his 'soul' during the three days he managed to get along without it in the Arimathean's tomb."

Can it be possible that the ungentlemanly author of such scurrilous

rubbish can be also the conceiver and utterer of the able peroration which concludes his pamphlet? If so he will be a dangerous orator when his audience is educated up to the appreciation of such powerful words: "The wheels of Progress are like the proverbial mills of God—they move exceeding slow; but on they move, from the darkness into the penumbra, from the penumbra into the light; and those who drive her triumphal car through the shining fields of the world's to-morrow shall look back over the plains they have left behind, and, far away in the rear, see your Ecclesiasticism crushed to death under the wheels, . . . the ugliest and slimiest of the snakes that had to be strangled before the Herakles of Humanity could rise from its cradle and realise the thought, the action, the glory, and the triumph which all lie in the arena of life for those who can win and wear them."

It is my opinion that the words of this noble peroration are altogether misapplied. I do not believe that the triumphal car mentioned will ever be the car of such very nasty mis-called Agnosticism as is preached by this falsely self-styled Saladin. Nor do I believe that he, or any like him, will ever drive, or ride in, any triumphal car whatever. But, alas for our poor humanity of the near future! Such as he may indeed head hordes of, as yet, unredeemed evil spirits; misleading and afflicting hosts; dragging downward and backward, instead of helping on "the wheels of Progress"; while at the same time other enemies of our race, promising the deliverance of society from these blasphemers, are said to scheme deep dark indefatigable conspiracy to gain a no less dangerous ascendancy for themselves over the souls and bodies of mankind; and especially of womankind; seeking the restoration to themselves of the wealth and power of the cruel sacerdotalisms of the Pagan and the Dark Ages; wherewith to destroy all liberty but that of their own hierarchy. These, while promising to put down atheism and licentiousness, would give us chains and darkness instead of liberty and light. They assume a falsely Christian priesthood which is utterly outside Christianity; and only sound and show; that they may rule the human mind through the prestige of that sacred word, for their own ends. The others—the open blasphemers—denouncing these, include in their denunciation all real Christianity and Christians; misapply noble sentences as in the above peroration; and, in their turn, promise deliverance to bewildered mankind, for their own selfish ends and glorification.

Evidently the time has not yet come when it will be no longer necessary for men to be "born again." "The wheels of Progress" which "are like the proverbial mills of God," do not bear forward either of these dangerous conspiracies against humanity ; the one dark and deep, and the other open, and openly blasphemous. The "wheels" bear forward, and are themselves moved forward by, that mighty yet simple Christianity, in which there is no place whatever for a power-seeking cruel despotic false priesthood ; but plenty of room for honest, gentle, loving, self-sacrificing, leading Christian men of learning, eloquence, and holiness ; devoted to the discovery and elucidation of the truths and beauties of Christianity—truths and beauties which seem to be ever inexhaustible with those who honestly seek them. Here alone is the perfection of true liberty ; brotherly love ; and brotherly equality ; with the total abolition of selfishness ; as the universal condition. Where the humblest, if there be any humbler than other, must be a perfect gentleman as a result of, as well as a qualification for, his Christian title and membership. This Christianity is the Herakles of Humanity—the Divine and Human combined—which in its early days strangled snakes, and has done so from the last days of Pagan Rome and Druidical Britain to the present time.

I took Agnosticism to be a humble innocent *Don't-know-ism*. But this preached by "Saladin" is anything but humble and innocent and modest ; blatantly claiming to be more knowing than all the rest of the Faiths of the World put together.

There will be sorrow and trouble for poor humanity from these two factions of its enemies, before the Car of Progress has triumphantly passed over them both into "the shining fields of the world's tomorrow," leaving them behind crushed to death under its wheels : and many a weary sufferer in the struggle against these snakes will feel as another such did in the struggle some centuries ago, when he wrote :

" Come gentle Death, the ebb of care ;
The ebb of care, the flood of life ;
The flood of life, the joyful fare ;
The joyful fare, the end of strife ;
The end of strife, that thing wish I,
Wherfore come death, and let me die ! "

The Herakles claimed by Saladin, but which will never be his, was supposed to have strangled the snakes at the time of the French Revolution. But see what we see of the republics of the world from that day to this. They boast of Liberty, Equality, and Fraternity—the Christian emancipation! But their Liberty is the coercion of a sullen nine, by a stronger ten ; and their Equality and Fraternity are practically the upsetting and trampling upon each other, whenever they get a chance.

You know, but some who may read this letter will not know, that in denouncing a selfish false priesthood, in the same breath with which I denounce the blasphemous false Agnostic, I am, curiously enough, denouncing no church, no sect ; and no individual of any such. I know that there are flourishing true Christian brotherhoods and sisterhoods in every church or sect ; independently of all sectarianism ; and I will not dare to judge who among them is false—I who am no searcher of hearts. Without daring to judge who may be false I am perfectly sure that in every grade of Catholicism, of Ritualism, of High and Low Churchism, of Methodism, and of every other sect, there is the true, the noble, the gentle Christianity, distinguished by its divine Charity ; as well as, in a smaller degree, incipient and secret hierarchical selfish, tyrannous, *false profession* of Christianity ; the individuals of which false profession are the wolves in sheep's clothing of whom the Master warned us. And true Christianity will be found in all the Christian "isms" just because all Christianity is entirely and equally independent of them all ; however Christians themselves may be deceived in that matter, with all their innocent differences. And Christianity is as equally inclusive within them all without being of them. God and conscience only must decide who among them is really false. Highly educated men may, however, reasonably judge who is less and who is more enlightened as to so-called Christian formalities, apart from the question of honesty and dishonesty. Old pagan forms have become inherited Christian forms ; as I have so often and conclusively shewn. And in the minds of many—in the minds of most—these forms have, innocently enough, become a consecrated inheritance ; and are devoutly felt to be a necessary part of Christian worship. Others, with more historical knowledge, and less of the consecrated inheritance, see and feel these things differently ; and are less liable to lose sight and touch of the true spirit of Christi-

anity—that divine Charity—in the observation of the non-essential inherited forms. Hence the many groups of leaders and followers, because of the many forms adopted or rejected ; groups assuming differing uniforms and differing banners, but all adopting the Cross in some form. And all, excepting the wolves, marching in the service of the one King. I have said that I will not judge individuals as wolves ; and I will not. And you know that although I use the word false-priest with bitterness, I ever love and revere the true priest in the word's true English sense of Christian presbyter ; and denounce only the false priest in the word's other sense of false *sacerdos* or *hieros* ; meaning the Sacred Sacrificer or Slayer, with his dreadful cruel tyrannous Power ; there being no such office in the Christian Church.

Without judging persons, and while leaving condemnation to God and conscience, we must remember the warning uttered against the dangerous false leaders in the churches, by the Master Himself, when he said " Beware of wolves in sheep's clothing." I have just referred to those Christian communities with whom, in the course of generations of gradual enlightenment, certain so-called Christian forms, which were inherited from ancient paganisms, have become less and less a consecrated inheritance ; while with others those forms are still cherished, and still innocently felt to be consecrated and essential to Christian worship. Now I think that any attempt on the part of an educated Christian priest to *re-impose* those old pagan forms, after they have been dispensed with through the past enlightenment of congregations, throws him open, very reasonably, to an alternative suspicion : either that he remains ignorant in spite of education ; and foolish and retrogressive ; or that he might *possibly* be the wolf. Because the old pagan forms and pageants were originally associated with the dreadful old pagan sacerdotal Power ; which was, during all its ages of existence, so cruelly exercised. Of course the latter suspicion might be wrong ; and he might be seeking to restore the old forms with no eye to the old concomitant Power ; therefore I decline to judge him. Then would come in the apparent Folly as the alternative ; the folly to seek to re-consecrate the obsolete which has actually lost all its old significance ; and really never had any rational application to the Christianity of Christ. The attitude of that arrogant man may justly be regarded with suspicion ; whether he endeavour

to force his innovations upon an enlightened and objecting congregation ; or whether he begin by endeavouring gradually to win over the weaker of the women to his views, and then gradually to educate their children to the same, taking advantage of the indifference or non-suspicion of the fathers.

As to old creeds and forms, and new departures from them in favour of less formal New Testament Christianity and its divine charity, I don't think any man ought to have his ears cut off on account of his religious views, and his practise or non-practise of religious formalities—the result of his own judgment and education and feelings. Let the man who lets alone the inheritances from paganism be respected for his historical knowledge and emancipation. And let us equally respect the honesty and filial piety of those who reverently adopt the religious forms which were revered and adopted by their fathers and mothers and generations of ancestors ; and in which they were educated ; and which have become consecrated in their hearts or feelings as part of the Christian religion ; because they do not know, and would never believe, that these forms had their origin in, or ever had anything to do with, ancient paganism. Yet there are some who would coerce all to the strict observance of their own particular selection of mere religious forms ; and would have the forms regarded as true religion, and the only true religion. And they seek to recover the old lapsed powers of what they call the church, whereby their predecessors used sometimes to cut off the ears of those who differed from them, as a sort of persuasion to drop the difference. And that was done only as a mercifully small foretaste of something more serious still in case the persuasion failed. This so-called religion we know must be a false religion, because it claims to be Christian, and we know it is not that. Is it possible that these are the successors of those whom the Master Himself denounced in these words :

" Ye hypocrites, well did Esaias prophesy of you, saying, This people draweth nigh unto me with their mouth, and honoureth me with their lips ; but their heart is far from me. But in vain do they worship me, teaching for doctrines the commands of men."

It appears that such people flourished in the days of Isaiah, and had their successors down to the time of the Christian epoch. Possibly they have lingered on through the Christian era thus far,

You may be sure that wherever the sacerdotalism of Archbishop Laud is lauded, there is sacerdotal tyranny sanctioned and intended.

And, now, what is the true attitude of the man with any special 'ism' whatever, the adoption of which he emphatically pronounces to be necessary for salvation? Does he not stand forth as the judge and condemner to perdition of the whole world outside his own very contracted circle of the only right ones?

This brings to mind a touching scene in the fifth chapter of Alexander M. Sullivan's "New Ireland," illustrative of the true Christian brotherhood of members of two apparently wide-apart sections; namely, a Quaker—William Martin, of Cork; and a young Capuchin Friar—Theobald Mathew, of the same city. The author refers to the excessive use of alcoholic drink among the Irish in the early part of this century; and the chapter is devoted to the history of the career of Father Mathew, who became known as the Apostle of Temperance. But before he took up this cause, and acquired this title, the author describes him as being engaged most earnestly in general labours of philanthropy; and writes:

"These labours inevitably brought him into association with good and philanthropic men of every creed and every grade; and the charm of his manner, his bright, genial, kindly nature, his unaffected simplicity and single-mindedness, soon rendered him as great a favourite with Protestants as with his own co-religionists.

"Amongst the former were some of the total abstinence advocates, notably the leading 'fanatic' of the movement, a man whose name is still [1877] warmly remembered by his fellow-merchants and fellow-citizens of Cork—William Martin. Long had this sturdy 'Quaker' and his gallant band preached the new evangel of abstinence from alcohol; but they felt that, though the Catholic masses around them respected them greatly and viewed them kindly, no one but a Catholic of influence and popularity could really give the movement headway amongst the people. One day while honest 'Bill Martin' and Father Mathew were making their morning visitation of an hospital, the constantly-suggested theme of the miseries which drink brought on the people came uppermost. Mr. Martin, in a burst of passionate grief or invective, suddenly stopped and turned to his companion, exclaiming, 'Oh, Theobald Mathew, Theobald Mathew, what thou couldst do if thou wouldest only take up this work of banishing the

fiend that desolates the houses of thy people so !'

"The young Capuchin seemed as if struck by some mysterious power. He remained silent, walked moodily on till he parted from his Quaker companion, then went home, pondering words which all that day and all through the night seemed still to ring in his ears, 'Oh, Theobald Mathew, what *thou* couldst do if thou wouldest but take up this work !'

"If there was one man in Cork city who pre-eminently had tried every other way of rescuing and uplifting the people, it was he. What had he not done, what had he not tried, and yet did not this drink curse start up at every turn to baffle and defeat his every endeavour ?

"But was not William Martin's scheme a mad and impracticable idea ? Was it not already consigned to failure by the goodhumoured laughter of the city ? Could *he* indeed do what his friend believed ?

"For some days Father Mathew considered the whole subject seriously. One morning, as he rose from his knees in his little oratory, he exclaimed aloud, 'Here goes in the name of God.'

"An hour afterwards he was in the office of William Martin. 'Friend William,' said he, 'I have come to tell you a piece of news. I mean to join your temperance society to-night.'

"The honest-souled Quaker rushed over, flung his arms round the neck of that young Popish friar, kissed him like a child, and cried out, 'Thank God ! thank God !'

"Thus entered Father Mathew on that work with which his name is so memorably associated ; thus began that wonderful moral revolution which was soon to startle the kingdom."

Is not this portrayal of Christian brotherhood and divine Christian Charity, between two such men, truly lovely as well as touching ? Anyone whose heart does not warm at this memory of that young Capuchin Friar, as did the heart of the Quaker William Martin warm towards him in that embrace, had better quickly overhaul his professed Christianity, and see for certain that it is really something more than mere profession.

The author, himself a Catholic, seems to take delight in quoting instances of the Christian brotherhood of apparently opposition sections. The next chapter he devotes to "The Black Forty-Seven"—Ireland's terrible year of famine and plague, and writes :

"No pen can trace nor tongue relate the countless deeds of heroism and self-sacrifice which this dreadful visitation called forth on the part, pre-eminently, of two classes in the community—the Catholic clergy and the dispensary doctors of Ireland. I have named the Catholic clergy, not that those of the Protestant denominations did not furnish many instances of devotion fully as striking, but because on the former obviously fell the brunt of the trial. For them there was no flinching. A call to administer the last rites of religion to the inmate of a plague-ward or fever-shed *must* be, and is, obeyed by the Catholic priest, though death to himself be the well known consequence. The fatality amongst the two classes I have mentioned, clergymen and doctors, was lamentable. Christian heroes, martyrs for humanity, their names are blazoned on no courtly roll; yet shall they shine upon an eternal page, brighter than the stars!"

He then gives the following as a foot-note :

"The Protestant curate of my native parish in 1847 was the Rev. Alexander Ben Hallowell, subsequently rector of Clonakilty. There were comparatively few of his own flock in a way to suffer from the famine; but he dared death daily in his desperate efforts to save the perishing creatures around him. A poor hunchback named Richard O'Brien lay dying of the plague in a deserted hovel at a place called 'the Custom Gap.' Mr Hallowell passing by, heard the moans and went in. A shocking sight met his view. On some rotten straw in a dark corner lay poor 'Dick' naked, except for a few rags across his body. Mr Hallowell rushed to the door and saw a young friend on the road: 'Run, run with this shilling and buy me some wine,' he cried. Then he re-entered the hovel, stripped off his own clothes, and with his own hands put upon the plague-stricken hunchback the flannel vest and drawers and the shirt of which he had just divested himself. I know this to be true. *I* was the 'young friend' who went for and brought the wine." Further on he speaks of the powerful assistance rendered to the Catholic clergy during these dreadful times by the Society of Friends, and says :

"Fondly as the Catholic Irish revere the memory of their own priests who suffered with and died for them in that fearful time, they give a place in their prayers to the 'good Quakers, God bless them,' Jonathan Pim, Richard Allen, Richard Webb, and William Edward Forster."

Truly these were all true Christians of several regiments of the one army—all the King's Own. But as to those who would stir up strife among the several regiments of the King's army, and interfere with their special disciplines, seeking to establish their own instead, what are they but mutineers, and the King's enemies, seeking only for themselves, or their hierarchies, extended Power and Leadership?

My own actual experiences strictly confirm these sketches from Sullivan's pen of the true bond of Christian Charity which unites sectional Christianity. The two personal extremes in this kingdom may be said to be the Roman Catholics and the Society of Friends. Like Sullivan I have met with equally lovable true Christians in both their churches—or divisions of the church—and in all the sects included within those extremes. The so-called Quaker dispenses with music in his religious assemblies—the music of sound, the music of colour, and the music of ornamental forms. The fact that he can be quite as true and good a Christian without these things proves that they are non-essential to Christianity. But for my own part I love to hear associated with Christian worship the full sweet volume of music—perfect and plenty—so that it be the trained utterance of the heart, or its accompaniment, and not mere form. And I confess to an inheritance from primitive man—pagan or not—of a preference for the most magnificent temples that the mind of man can conceive, and his hands erect, in honour of the Deity from whom he inherits his divine powers of genius—the perfected expressions of the music of sounds, colours, and forms. The Quakers do without them, counting them all earthly, while they seek for heavenly things in their assemblies for prayer and praise. They are certainly the non-essential part of Christianity ; still, earthly as they are, we love them as divinely earthly—the expressions of faculties belonging especially to the divinity of manhood, and exerted in homage to the Supremely Divine Giver of those faculties to man and man alone on this planet. We think that these expressions should be the most perfect that man can utter—the offering of the most divine results of human genius in honour of the Most Divine Most High. And we see no possible excuse for that utter slovenliness of worship, in which these things are professedly adopted ; yet carelessly and very faultily expressed ; as with some so-called Low-Church communities. Where they sing inharmoniously, as if to sing correctly were a sin. Yet they sing !

Far better would it be to adopt the Quaker's course than that. Further to defend the Quaker let me say again that while approving the magnificence of the Christian temple and the grandeur of its sacred music, we have authority for saying that Christian worship is just as real and complete without them ; and very often more so. The Divine Master shewed His appreciation of the temple as His Father's house, and the house of prayer, when He indignantly cast out the traders and their traps therefrom. But He warned His followers against mere formal showy pretence of worship ; and bade them rather than do as the hypocrites did in the temple and in the synagogues, to pray in strict secrecy, saying “when thou prayest, enter into thine inner chamber, and having shut thy door, pray to thy Father.” “And in praying use not vain repetitions as the heathen do.” Yet I am afraid we do use some vain repetitions as the heathen did, in some of the public services. Now if the inner chamber with the door shut will do as well as the temple or the synagogue, we may respect the Quaker and his meeting house. And let us remember that very robust early Christianity which flourished in the Catacombs of Rome, while the temples were all dedicated to paganism.

LETTER XXI.

THE DIVINITY OF CHARITY.—THEISM : PANTHEISM : AND AGNOSTICISM : OR, GOD : GOD EVERYWHERE : THEREFORE GOD INFINITE AND INCOMPREHENSIBLE.—THE MIND IN ANIMALS.—SALADIN AND BURNS.—THE MYSTERY OF EVIL.—THE WOLVES IN SHEEP'S CLOTHING.—THE REVOLUTION.—THIS TRANSITORY LIFE.—THE DIVINE MYSTERY OF HEALING.—MR. LAING'S BEAUTIFUL AND HUMBLE AGNOSTICISM.

22 NOVEMBER, 1891.



HAVE been still thoughtfully dwelling on the subject of Christian Charity and contrasting it with selfishness, as both qualities, in their various degrees, have been exhibited in characters met with during life ; and the longer I live to watch and ponder and learn, the more convinced I

become that true Charity is the truest human divinity of nature—the divine human nature nearest to Godhood. And that selfishness in its various degrees all tends towards the opposite pole ; and in its intense degree is nearest to the incarnation of that ugly repulsive evil which we call the very devil. The active natural affinities exhibited in the various appetites of animals, even to the extent of ravenousness, are not, however, to be regarded as diabolical. They are part of God's art and mystery of creation and preservation. In procedure they are therefore divine, although they do not therefore constitute any degree of Godhood in the minds of the animals thus merely instinctively, and unavoidably operating them while animal vigour lasts. Thus even a hen is God's agent of creation and preservation ; and the operation of her patience in sitting, and of her care for her chickens, and self-devotion to them is lovely to behold. Yet she is naturally the symbol of extreme selfishness. She does not hesitate to snatch a tit-bit from the mouth of a hungry sister, whose own tit-bit it was by right of first capture or finding. And this shocking rudeness and selfishness is not prompted by her own state of starvation. All the hens are as it were at table, feeding at the time, when the ugly snatch is made. And I believe they are all as bad, one as another, and equally typical of selfishness—dishonest selfishness. So I think the hen is far from that divinity of nature which approaches to Godhood ; although God's agent in rearing chickens divinely.

And now what is the true Charity which is Divine, and which, so far as we can see, mankind only has attained to, and no inferior order of the earth's inhabitants ? For we must not include in this actively divine charity any love that is merely sexual or maternal or paternal. When the cock denies himself the good things which he finds, and calls his hens to them, he is in lovely contrast with the ravenous rush of greediness ; and especially with that hen who was just tugging at her sister's captured worm. But his politeness is only sexual, and he is only engaged in just the same agency of Divine creation as the same selfish hens will be when their eggs are ready for their sitting, and their chickens are ready for their feeding and protection. Then what is this true Charity which is Divine and akin to Godhood ? It is not that charity of the man who gives, however freely and wisely, that he may become famous for his generosity and win the title of the Benevolent. His gifts are all acts of pride, all for self,

self-gratification, selfish. He is investing his money for a return of what he values more than the money—Fame. Neither is it this truly divine charity when a man, having full faith in a future eternal life, gives, however freely and wisely and secretly, with the belief, and because of the belief, that his gifts in this life, which he could not have carried with him to another life, will be restored to him in the future a hundred-fold. This is, again, in intention, mere selfish investment. I do not dare to guess or estimate what will be his actual reward for the good he has actually done in this investing disbursement. And by no means do I mean to hint that the actual good he does to others will not beneficially redound to himself. But this is certainly not the uncalculating charity which is true divinity—nearest to Godhood.

To love one's neighbour as one's self is getting on towards this Godhood. But I should say that the will to sacrifice one's self to save one's neighbour ; without the knowledge of a third person ; and without any calculation as to the recovery of heavy damages in a future life ; but all out of the impulse of compassionate sorrow and love for that neighbour ; that surely is the Divine Charity, the Divine Love, the human Godhood itself ; of which only godlike human nature is capable on this earth ; and which puts an end to the "born again" process for ever. For such Love is of God, and God is Love. Such also was the love of Christ and of Buddha. Now how can any man who is not thus Christ-like, but is full of worldly selfishness—let him wear whatever vesture he may—be a true Prince of the Church, or an Ambassador of God in any sense or degree? This is the true qualification for leadership in the Church ; and I should say that any man seizing a leadership therein without it, might indeed be one of the Wolves. Yes, the Princes and Princesses of the Church are only those who are gifted with this perfect Christian Charity, however lowly their position in this life, and however unrecognized may be their Princedom in this life, for they include many of the very poor and of the very obscure among men and women.

We have had occasion to remark on the ravenousness of dear little dogs, whom we love in spite of it ; those little dogs who will growl fiercely at a most dearly-beloved human friend on the pretended demonstration of a desire to share with it its little pile of offal, or a captured rabbit. The dog as a rule has advanced sufficiently in his

promotion of incarnation to shew his kinship to man ; and his great capacity of love for him ; without in the least degree regarding man as a god. But he has not yet advanced sufficiently to share with man the human Godlikeness of Christian Charity ; and consequently is not yet ready, I should think, for the speedy inheritance of angelic wings ; but must, like the selfish man, be born again.

This is only a very cursory reference to the Divinity of that Charity which appears to be a potentiality of mankind only, in this terrestrial creation ; which may be more amply worked out by further observation and thoughtful research.

And now, instead of returning to the pages of "Modern Science and Modern Thought" I have been glancing at the pamphlet you kindly sent me on "Robert Burns" by "Saladin," and pursuing the same train of thought which occupied us in the early part of the last letter. The more I think of Mr Laing's separate definitions of Theism, Pantheism, and Agnosticism, the more convinced I am that the three combined form one great truth. That truth in my mind assumes a sort of pyramidal form, thus :

GOD :

GOD EVERYWHERE :

THEREFORE GOD INFINITE, AND INCOMPREHENSIBLE.

No one will be so bold as to profess that the human mind can comprehend the Infinite. And of this pyramidal symbol of God we can only glance at the apex, the base descending and spreading out infinitely, and the whole is therefore "not knowable or even conceivable by any faculties with which the human mind is endowed in its present state of existence."

We know little of the nature of the minds of animals—which are certainly our inferior fellow creatures ; although they have some faculties which we have not ; of which we certainly know nothing ; which are incomprehensible to us ; and which so often puzzle us by their operation. But one would think that Agnosticism alone *might* be the state of mind of a fly, or a cat, or a dog, or a horse, or a donkey. It *may* be, even, that they know better, and are higher in the scale of knowledge than the poor human Agnostic. We cannot be sure.

I do not at all understand how Saladin claims to be an Agnostic. He seems to me no more an Agnostic than a Saladin. He seems to

know everything so much more conceitedly and better than everybody else. His Agnosticism, instead of consisting of modest Don't-knowism appears to consist of self-conceit, rancour, and rant.

On page 3 he objects to Burns' words "Unknown, Almighty Cause" as contradictory, saying : "if a cause be 'unknown' it is not known whether it be 'almighty' or not." I think the Infinity of the Almighty Cause justifies the term Unknown ; as being incomprehensible within the human mind. Yet the mind comprehends *enough* of it to justify the term Almighty ; perceiving none other so mighty.

Then he objects to Burns' description of the Cause as "all-good," saying : "If the 'cause' be infinite, as is claimed for it, and 'all-good,' then there is no room in the universe for the presence of evil ; but that evil does exist is an inexpungable fact—*ergo*, the 'cause' is not infinite and 'all-good.'"

What is evil? I quite agree with him that there is evil in the universe, and I presume I am Agnostic in saying that it is a mystery to me, and that I do not understand it. But, what is evil? From my point of view "Saladin" with his rancorous hostility to Christianity is part of the evil ; and that Christianity which he would destroy is, on the other hand, from my point of view, supremely good ; and is the Light of the World. From his point of view Christianity is Evil and Darkness, and it is he himself who is Good, and the Light of the World. We suffer pain and it is our evil, but it may be also our ultimate good. Why evil exists is a mystery ; but a mystery which does not necessarily dethrone the Almighty. It is only one of many mysteries which we cannot solve. For aught our human minds and our human logic can tell, what we regard as Evil may be only a part of Almighty Wisdom and Power. Such blasphemous logic with its "*ergo*" is poor nonsense. On page 4 Burns is described as "a gnostic, not an agnostic Theist." And on page 7 he is described as invoking the God of the Christian with irony and mockery, and Saladin says : "'O Thou Unknown, Almighty Cause' is on the contrary, not 'the God of the Christian,' but practically that of the Agnostic ; and he is invoked with adoring reverence."

I shall certainly never undertake to champion the forms and ceremonies and sentences with which Christianity has been dressed up and labelled by human authorities. Let such as Saladin peck at them and tear at them at their pleasure, and Christianity will be all

the more beautiful and true for the undressing. And so, here again, the evil may be turned to good. In these attacks the false Saladins may surround themselves with hissing squibs, and snapping crackers, and call them and their noise their light and glory. But all the “going off” will be only outside show, and will never prove a mine to blow up anything serious.

There seems to me a great deal of childishness in Saladin’s carping at words and sentences, and he flourishes his logic like some rattle which he has newly acquired and is anxious to exhibit. The foundations of true practical Christianity will not be shaken by his carping at the words “an ass and a colt the foal of an ass.” When all the faulty human words and sentences connected with Christianity have been criticised to death ; and when all the deep dark conspirators who have laid hold of Christianity for their trade ; and constituted themselves its interpreters *for their own selfish ends*, are scattered, and their occupation gone ; then true practical Christianity will, I repeat, remain yet more beautiful in its native beauty than ever ; for what of human invention can possibly supplant it ?

The bitter enemies of Christianity are, naturally, very un-Christian-like. They are of a kindred tribe to the desperate fallen spirits who did such shocking things during the French Revolution. They seek by levelling their neighbours down, to level themselves up. They are not happy, and think it is because they are not rich ; and they look for riches in revolution. No wonder they are so bitter against the Christianity which stands as a great force and law in their way. They want it, as a restraining power, removed ; as one of “the snakes that had to be strangled before the Herakles of Humanity could rise from its cradle and realise the thought, the action, the glory, and the triumph which all lie in the arena of life for those who can win and wear them.” Their Herakles of Humanity is the Reigning Terror of Revolution ; and their triumph in the arena of life means their successful elbowing in the struggle to grasp the spoils of confiscation. No wonder they are so bitter against the Christianity which bars their way ; the religion of self-conquest instead of selfishness and self-conceit ; and of universal brotherly love, its true members ever finding more happiness in giving than in receiving ; the religion which confers more happiness than any other—the happiness of

Christian Faith, Hope, and Charity.

As to those other reputed conspirators against this divine religion—those very few, we trust—who are said to claim to administer it their own way for the most money ; and misinterpret it ; and misrepresent it ; and dress up it and themselves in strange guises to make it a paying pageant ; those who are said to declare that the Church, meaning the false priests, shall be restored to its greatest power of the past, meaning the false-priestly tyrannies of the Dark and Pagan Ages—they are said to be in high spirits at their success thus far. But deeply clever as they are in their ways, they will be sure to make mistakes which will ultimately lead to their destruction as a power for evil. But they may do much evil first—and here we have the mystery of evil again, which they themselves call very good. Their destruction as a power for evil will come about ultimately from the very nature of, and as a consequence of, their pretence and endeavour to enforce the general adoption of their own particular 'ism of forms as the only true religion of the only right ones. General Christian brotherly love, and general Divine Charity, are not to be attained by any attempt to bring about the universality of either a uniform ritual, or no ritual at all. Such an attempt persisted in from any quarter becomes aggressive, and leads to war, and war's consequent bitter hatreds ; in place of the Christian brotherly love, and the general Divine Charity, which latter should extend to all fellow-men regardless of any creed whatever. Among Christians the brotherly love can only be maintained by the mutual recognition of the various distinguishing ensigns of the King's Own regiments ; and the mutual salute of flags. In a contest for Christian uniformity of form there will certainly be no ultimate conquest for the uniformitarians, but only the conquest of them.

I spoke of so-called priests who by innovation dress themselves in strange guises as part of a Christian church pageant. We may safely assert that no such vain and showy guises were ever worn by Christ or any of His Apostles. But those very fashions *may* have been worn by proud Pagan priests both before and after the terrestrial days of Christ and His Apostles. There is certainly nothing in them of the nature of Christian self-denial, modesty, and humility ; nor of Christian pastorality ; nor, surely, of the fashion of that vesture which was seized by the Roman soldiers, of which it is written : "And when

they had crucified him they parted his garments among them, casting lots."

As to the false Saladins, you and I know very well that those men who regard wealth as happiness, and would overthrow Christianity and all law, for the chances that anarchy and revolution would give them of seizing some of the world's wealth, are utterly deluded. They believe the arena of this life to be the only and ultimate arena for their "thought, action, glory, and triumph;" and that there is nothing to win beyond it. While we feel so sure that this life is but a small temporary part of the journey to something vastly greater and better; and that lasting happiness in it is impossible, with any amount of wealth. When I and my dear friend from Brisbane were talking on this subject a few evenings ago—the last evening he spent with me—I used these words : "I am convinced that no human inventions will ever make this earth a Paradise of human happiness. I have searched and observed closely, and have never yet found a truly happy man or woman. Those who are short of health think they would be happy with health. Those who are short of wealth think they would be happy with wealth. Those who are short of both health and wealth feel *sure* they would be *supremely* happy with the two blessings combined. Yet I have never found a happy man or woman—beyond very transient happiness—among all the healthy and wealthy that I know or have ever known. I feel sure therefore that the earth is no settled final home for humanity ; but a country of travel to something better ; and that the Majority have found this out. If it were not so, Creation would appear to be a great failure ; which I do not believe possible." My friend then remembered how all those whose secrets he knew, or had known, had each some great sorrow, although life abounded with blessings ; and the rich seemed to be no happier than the poor ; and he admitted that this life could not be the final arena and haven ; and seemed to be more reconciled to his own great sorrows, which had almost led him to doubt the omnipotence of God ; since he had led so devout a life, and had ever been so reliant on Providence.

How silly and unreasonable it is in the Saladin mind to denounce Christianity and jeer at its Founder, because the Church has been sometimes partly taken possession of by wolves in sheep's clothing ; when the Master Himself foretold that the very thing should happen,

saying : " Beware of false prophets which come to you in sheep's clothing, but inwardly they are ravening wolves." Here again is presented to us the mystery of permitted evil, foreseen and foretold. But what right or reason have we to rebel at it ? These ravening wolves may be performing, unconsciously, part of some great hidden work of evolution which shall result in their own final transformation from ravening wolves to true Christian lambs. But, meantime, we are warned that they are none the less false, and ravening, and we are told to beware of them. So let us ; for it is said that they are among us.

Life is a mystery, and all creation is a mystery. And to say there is no God because we cannot comprehend His Infinity is like saying that there is no Time Present, because we cannot comprehend the Eternity of the Time Past, and the Eternity of the Future ; any more than we can admit a beginning and an end. Every creature who can think on these things is himself or itself a witness of the power and presence of the all-pervading God ; as well as a witness that himself or itself is completely subject to, yet as completely devoid of, that creative and sustaining power. This may sound contradictory, but it is true. If we break an arm we cannot mend it of our own will, thought, mind, or skill ; but it is done for us from within in a wonderfully skilful manner ; and the fracture is perfectly repaired, and the part made stronger than ever. Here is Pantheism in which the creature, being a creature, is certainly no Theos. And this Divine work goes on within us in rectifying all our ailments and repairing all non-fatal accidents. And so it is with all organisms. And surely this is Almightiness and All-goodness in the Infinite. The false-Agnostic idea seems to be that the All-goodness should prevent you from breaking your arm, or wounding your flesh. I don't see that. We are provided with precautionary instincts. But I do see the All-goodness in the Almighty mending, after our carelessness or misfortune.

The Agnosticism comprehended in Mr. Laing's definition seems to me humble and innocent and hopeful. There is nothing about it dogmatic, final, or exclusive. It is an admission that there is something wonderful and vast " behind the veil ; " too vast for human comprehension *at present* ; and implying that there is a future for the human mind higher and greater than the present. It acknowledges the universe to be so immense as to be incomprehensible. To

associate with the idea of this incomprehensibility the statement that there is no God is a contradiction of the word Agnostic ; and I do not understand Mr. Laing to mean that, although others do mean it. It is altering the Don't-know to Do-know. The Cause of the immensely wonderful and incomprehensible is the incomprehensible God, use what Name or Word you will—even Law ; because it is the infinite exercise of Infinite Power. This Power and its universality are parts of the Agnostic incomprehensibility ; and the universality is the Pantheistic part of the truth. It is the “one universal, all-pervading Mind” working from within all things, as well as from without all things. When we model a statue we work from without. When God, the all-pervading Mind, models a statue, He works from within as well as without. From without He sheds the warmth and light of Life upon it, while the work of mechanical creation all goes on within. I have before given the common cabbage-caterpillar as an instance. When he has done feeding on his unfailing and only fare of cabbage, his external shape changes and he becomes a chrysalis—a mass of moist matter sometimes described as “squash,” tightly enclosed in a case. And therein the “all-pervading Mind,” the “all-wise and all-powerful Creator,” exercises His wisdom and power, in the dark, within that little prison, “behind the veil” most assuredly, and perfects the dainty lovely butterfly ; modelled so delicately and winged and feathered so gloriously, that it has become man's symbol of the metamorphosis of the human soul ; from its state of earthly degradation and darkness, to its angelic life of immortality in Heaven.

Thus we have all the “metaphysical conditions” quoted by Mr. Laing, combined and welded into one ; and fitting without division as I said before ; like the crimson, yellow, and blue of the solar spectrum ; yet all extending infinitely beyond a surrounding horizon of mystery. Infinitely, because, although we cannot possibly comprehend that, we know it must be so, the conception of a limit being equally impossible.

Pardon me for dwelling so long on this awful subject ; floundering about in dimness, and mists, and mysteries, and dazzling light, and profound darkness which no faculties of the human mind can ever penetrate in the mind's present state of existence.

LETTER XXII.

THE THEORY OF ELECTRIC FRICTION EXAMINED.—THE WHOLE MATERIAL UNIVERSE COMPARED TO A CLOCK.—DIFFERENT PHASES OF AGNOSTICISM.—THE DIVINE CLOCK AND THE DIVINE CLOCK-MAKER AND KEEPER.—PRAYER ALL A MISTAKE.—SLEEPING BRAHM.—WAKING BRAHM.—THE HINDU TRINITY.—SOUTHPORT.—SPIDERS AND THEIR WAYS.

6 DECEMBER, 1891.



TURNING to page 71 of "Modern Science and Modern Thought," at which we last paused, we read on and find on pages 73-4 these words :

"If the two poles of a battery are connected by a thin platinum wire it will be heated to redness in a few seconds, the friction or resistance to the current in passing through the limited section of the thin wire producing great heat. If the wire is thicker heat will equally be produced, but more slowly."

I don't think the term "friction" is correct. The motion of electricity is flow *without* friction. It is not a substance, to produce heat by friction against or through a substance. It is itself the heat which may be aroused in substances by the friction of substances ; and in the platinum wire the radiant light and heat are merely the completion and condensation of the two opposite currents or conditions into one perfected radiance ; having nothing to do with friction in and against its own *conductor* the platinum, not its detainer or opponent.

On page 76 the moon is spoken of as "apparently a burnt-out and dried-up cinder without air or water." I feel sure that I shall be able to prove there is a lunar atmosphere ; but a better opportunity will probably occur to go into this question. This Third Chapter is thus summed up : .

"What we really can see is that throughout the whole of this enormous range of space and time law prevails ; that, given the original atoms and energies with their original qualities, everything else follows in a regular and inevitable succession ; and that the whole material universe is a clock, so perfectly constructed from the begin-

ning as to require no outside interference during the time it has to run to keep it going with absolute correctness."

Is this another phase of so-called Agnosticism? I say "so-called" because the word seems to me mis-applied in all the developments of it which have been presented to me. There is the Don't-know-ism which I suggested might be the state of mind of a fly or a donkey; with the rider that *perhaps* they know better after all, than the human know-nothing. There is the so-called Agnostic who thinks he knows better and can see farther than anybody else, and delights in blasphemy generally. There is the so-called Agnostic who says he cannot see God, does not know God, and affirms, therefore, in a gentlemanly sort of way, that there is no God. This Clock idea seems to suggest that there *was* a God, who made it in the beginning, but that He does not even wind it up now; it goes so well of itself, and the Maker has disappeared somewhere or nowhere. Surely you and I must be the true Agnostics! for we affirm that the Wise Man Knows that he Knows Nothing. The more the light of true science reveals to us, the more does it at the same time reveal to us, in undefinable dimness, the immensity of the boundless horizon—the unknown, compared to which the known is as *nothing*; and, therefore, the knowledge shews us that we know not. But that does not add to our contempt of our fellow creatures, our arrogance, and our defiance of things generally. It adds to our humility, faith, hope, and prayerfulness. For if we do not see God, we see His *hand*, as it were, in His works that are revealed to us; so many as they seem, yet so few as they are compared to His works in the dim boundless horizon—the infinite whole.

The word "interference" in the last quoted passage, reminds me of the words in the Preface, to which I promised to return, namely, "the prevalence of law throughout the universe to the exclusion of supernatural interference."

How naturally this Modern Thought of the Clock reminds us of the Ancient Thought of the Hindu on the same subject. The ancient Hindu mind, long before the days of the Compassionate Buddha, strived to penetrate this subject of the Creation accomplished—the Divine Work *Done*, "and, behold, it was very good." But what becomes of the Maker of this perfect Clock of the Universe—its Maker and its Law-Maker, when the good work is done? Where is

He during all the one hundred millions of years claimed, and millions more, that the Clock is self-acting ; so perfect as to require no further "*interference*" during the time it has to run to keep it going with absolute correctness"?

This Divine Clock, it appears, needs no winding up at all. The Maker has made this perfect Clock, and His "services are no longer wanted." But who can tell that there is no "*interference*" in spite of this human fiat? It astounds me that, knowing that we know so little, we should dare to pretend to know this. Is this Don't-knowledge? Does it accord with the "*Behind the veil, behind the veil,*" expression? As to "*supernatural interference*," the living power, order, and working of the universe is surely *super-EVERYTHING*. And yet, being natural, it is certainly not super-natural. But, no "*interference*"! If this be true wisdom mark the folly of the faithful of all the Faiths of the World ; who believe in prayer ; and ever constantly pray. Why pray to the Maker of a Clock who is discharged from any interference with His Clock, of which you are a part? The ancient Hindu thinkers thought about their Supreme Brahm until they made him to be so much Everything as to be Nothing ; which is very curious. And I suppose he must be the same as the "*Unconditioned Absolute*" of some of the so-called Agnostics. So, the Maker of the Clock of the Universe has so filled the universe with His Clock that there is no room left for Himself ; nor anything more left for Him to do. And, like Brahm, He has become totally inactive. The Hindu thinkers sent their Brahm to sleep for unnumbered ages ; having nothing for him to do. But this was before the Clock was made. After the unnumbered ages, he suddenly awoke and used the expression "*Brahm is*," or, "*I am*" ; and immediately called the universe into existence. Then, curiously enough—Ancient Thought like Modern Thought—he went to sleep again. I prefer the other thought about Brahm to this sleeping thought or the clock thought ; namely, that from the bosom of Brahm came forth the Trimurti, or Trinity, consisting of Brahma the Creator, Vishnu the Preserver, and Shiva the Destroyer. Here we have at least activity instead of the slumbers of the unnumbered ages. Why should the Almighty doze, while the Clock goes? It is all an awful mystery ; but none the less so, and none the better, for this idea.

I have spoken of a fly as one of the sort of fellows that one would

think likely to settle down to Agnosticism. As the word Agnosticism is so many-phased and even self-contradictory in its use and application, I must ask you to excuse me if I sometimes seem inconsistent in my handling of the word. I think I must now tell you a *story* of a conversation between a fly and a spider, which is relevant to our present subject. The scene of the story is Southport ; and the time, when I was there a few months ago. Southport is a lovely place. There is plenty of amusement there for non-thinkers, and for weary thinkers ; and plenty of inspiration for the poets and the strong thinkers. There is plenty of good music ; plenty of promenade, both fashionable and quiet ; and magnificent conservatories filled with the choicest plants. There are delightful streets, with leafy Boulevards ; and a delightful marine Parade and Pier ; although too much sand and too little sea. My favourite resort when it is wet there is the Winter Gardens ; or, rather, the great Conservatory ; which, being a grand temple of Flora and Apollo combined, is a place of inspiration. There is a gallery in that beautiful lofty crystal temple where a good military band plays on certain evenings at what is called a Smoking Concert. It is then a palace of enchantment, either with or without the cigar. From the arches of the crystal roof shoot down rays of blue electric light like that of the suns of some constellation drawn nearer to us ; while all around below, at elbow-level, among the flowers and shrubs, are numerous arcs of the rich soft golden electric light. And the smooth cool asphalted pavement is all richly diapered with the sharp shadows of palms, tree-ferns, trailing plants pending from high up in the roof, and all the choicest foliage of floral nature. No other light can cast such lovely diaperery of shadow as this overhead. There is rich floral ornament wherever the eye can roam ; and there is rich ornament in the very air besides. For what is good music but sweet expression of aerial ornament or design poured in at the ear ; unseen ; but felt, by the revelation of the ear to the brain and heart ? And the progressive human discovery of instrumental music and the tracing out of those charming aerial ornamental designs is—like all things—wonderful. The architecture again is like another version of music rendered in stone and iron and glass. And the diapered pavement of this beautiful temple of brightness and incense and music, is trodden in unbroken procession ; in winding ways among the arboreal clusters and the golden lights ; by the feet of the most beautiful of

women, side by side with the most manly of men—trodden to the time of the sweet stirring music ; so that these gods and goddesses, for whose joy all this scene is called into existence, seem to be part of the music ; and the music part of them, for they feel it in every nerve and vein. Here seems prevalent happiness—the Garden of Eden restored ; with the added effects of the fruits of the Knowledge of Good and Evil—yes, indeed ! for, added to the happiness, every one of these promenaders has some special sorrow ; either acknowledged or hidden in secret. But what has all this to do with the spider and the fly ? Why they both live here in the midst of all this ; and we wonder what *they* think of it. They *live* here ; for a very good living is to be had here. To say nothing of the flowers and their honey, there is, connected with this Conservatory, a large galleried Hall, used also as a Promenade and Concert Room, and containing a fine Orchestrion which plays daily when the other bands are silent—for the Orchestrion is a complete and very good band in itself. And in this Hall is a bounteous refreshment stall, piled up with good things, and ready for teas with plenty of cream and milk. So for the flies this is a land flowing with milk and honey ; and what is good for flies makes good for spiders. I remember having said something to you before about flies ; but don't remember saying anything about spiders ; and there is much to be said about them. The spider as a rule is a very respectable fellow. He is thoroughly god-fearing : which the fly is not. When I say that the spider is god-fearing, with a small g, I mean man-fearing. For I suppose that men, in his eightfold sight, must be as gods. Especially must a handmaid, flourishing a broom for her magic and mighty sceptre, appear an irresistible and terrible goddess of Destruction. The spider has very much the nature of the dog ; with some exceptions, of course. I never hurt spiders wilfully, but often rescue them from drowning ; and know something of their ways. The other day I saved one and was rewarded. I found her in the wash-hand bowl of my office, apparently drowned in the clear water with which the bowl was supplied ready for use. But I know their ways. She had all her eight eyes upon me while pretending to be dead. While fearing the gods she thought she could deceive them. I lifted her out tenderly and placed her on a little shelf outside the door in the open air. There she lay on one side just as I deposited her ; all wet, and all of

a heap with legs entangled. There was no movement of a limb. She may have winked an eye ; but I did not detect it. So I turned away a few steps with my beard upon my shoulder, as they say, only I wear no beard ; and up she started as lively as possible to examine her quarters. She made off at a run for a corner of the little shelf ; where I then perceived there was a ragged dusty bit of a web. Instantly there rushed out from concealment another spider, about half the size of the rescued, and dashed upon the intruder. Some angry words passed but I could not catch them. The big one wanted to pass towards the corner, to which the little one objected ; and they "had words" for two or three seconds. They were very close together, when the little one suddenly snapped at the big one ; and the big one bolted, chased to the very edge of the shelf, and right off the domain. Just as a big dog will flee from a little dog when the big dog knows that he is in the wrong ; and just as a little dog will attack a big dog when the little one knows he is in the right. The same sort of nature and sense of justice prevails with spiders as with dogs. Still there are naughty spiders, and naughty dogs, and naughty men. But the fun of this incident was that the little shelf was *mine*, and did not belong to the little spider. I believe I fixed that shelf myself about 20 years ago, with my own hands. I am sure it is mine. Thus, like the spiders claiming our shelves and our corners, do we claim God's planet ; and parcel it out among ourselves ; and say "It is mine ;" and sometimes refuse to pay homage and service for the fief. You have seen how the rescued was a god-fearing spider ; and so would the little spit-fire have been, had not all his eight eyes been blinded with rage at this intrusion upon *his* premises.

There is so much more to be said about spiders, that I think I will post this, and begin again. And I shall beg leave to defer my story of the conversation between the spider and the fly until I have made an introduction to you of spiders in general, who do not generally introduce themselves as the flies do.

LETTER XXIII.

THE METAMORPHOSIS OF PRINCESS ARACHNE, THE MOTHER OF SPIDERS.—THE WONDERFUL SKILL OF SPIDERS.—THE MASON.

— THE HUNTER.—THE DIVER.—THE RAFT-BUILDER.—THE SAPPER AND MINER—THE TERRIBLE TARANTULA.—THE AERONAUT AND HIS HEREDITY.—WHAT IS INSTINCT?—THE FASCINATION OF THE TARANTULA.—THE SPIDER'S ANÆSTHETIC.—CARNIVOROUSNESS A DIVINE INSTITUTION.—KING SOLOMON AS BOTANIST AND ZOOLOGIST.—ARISTOTLE.—THE TETRIX OR CICADA.—ORIGIN OF PANTHEISM.—THE CARPENTER BEE.—BAAL-ZEBUB.

13 DECEMBER, 1891

TOU will doubtless remember that the spiders claim descent from Apollo ; and, consequently, from Jupiter, the Father of the Gods. They are called Arachnida, from Arachne their mother, a Lybian Princess, who was the grand-daughter of Phœbus Apollo. I have already had occasion to write about Arachne, and said :

“ According to the Greek story this lady was very expert in weaving tapestry and spinning, and challenged the goddess Minerva to a competitive trial of skill. Arachne was beaten ; and, in consequence, was so mortified, that she attempted suicide by hanging. Minerva however prevented the deed and turned her into a spider ; in which condition she was permitted to hang to her heart's content, but not by her neck—the metamorphosing goddess having deprived her of a neck—and still retained her marvellous skill at spinning and weaving.”

There is before me now a little gem of art in porcelain ; a small tablet, with white bas-relief modelled on a dark blue ground, shewing the beautiful Princess Arachne at her disastrous task. She is very charming ; quite the Grecian goddess ; sitting on a very pretty wicker seat, and weaving a web such as her descendants weave to this day ; like an incipient umbrella-top. It is interesting thus to contemplate the beautiful Mother of All the Spiders—the divine but unfortunate grand-daughter of Effulgent Apollo—before her metamorphosis. I may be no judge ; but I should say that her descendants have improved upon her skill. No wonder the spiders are god-fearing folk. And this is what I wrote about them in 1878 :

“ It is but uttering a truism to say that all God's creatures are divinely endowed. The spider, however, may be said to be very much divinely endowed. Its anatomical mechanism is marvellous,

even exclusive of its six, eight, or ten-fold gift of sight, which simultaneously surveys the whole compass of things above and around. But its share of mind is even more marvellous ; and, like the ant and the bee, the spider proves that mind is not necessarily proportionate to the bulk of matter in which it is seated ; and that the mysterious essence may be largely condensed, and wonderfully operate, in very minute quantities of matter. The forethought, purpose, and contrivance of mind ; and the mechanical skill exercised in carrying out the mind's conceptions ; as evinced by the Mason spider, in its cleverly-made cell, with its neatly fitting and wonderfully hinged circular trap-door ; are enough to put to the blush the most skilful human mason, or potter, or carpenter, or turner, who ever boasted of workmanship ; the carpenter with his full chest of tools, and the turner with his lathe and gouges. And it is curious to reflect that the forefathers of this little spider were perfect in their creative skill —so mysteriously God-taught—long before *our* forefathers had any notion of making doors and hinges, and when they were in every art and industry very clumsy lumbering fellows indeed compared to the spiders. This specimen of the trap-doored spider's house has brought to my mind a little book which was a great favourite of my early childhood, entitled : ‘ Uncle Philip's Conversations with Children.’ The author of that book gives an account, not only of the Mason spider whose habitat is the south of France, but of another also, a bigger fellow, which he had seen, and whose workspidership he had examined in Jamaica. He says : ‘ The nest or house which I saw was a tube made of very hard clay, about six inches long, and an inch across, and was a little bent at one end. The inside of this tube was lined all the way through with a kind of soft silky stuff, something like silk paper, but stronger, and it was of a yellowish colour ; but the curious part was the door. I never saw anything that an insect had made more strange than that. This door was round, about as large as a quarter of a crown-piece, and was a little hollowed on the upper side like a saucer ; the inside of it was rounded like the outside of a saucer. It was of the same stuff with the lining of the nest, and seemed to be made of more than a dozen pieces of that lining, put one on the top of another ; it was shaped so, too, that the inside layers or pieces were the broadest, and the outside ones became smaller and smaller, except at the hinge, which was about an inch

long. All the pieces of the door were joined at the hinge, and then the hinge was joined and worked into the lining of the tube. That made the the hinge the thickest and strongest part of the whole work. How the spider made it so, I cannot tell ; but so it was, that this hinge not only was a hinge, but was so good a spring that whenever the door was opened it would shut itself immediately ; and when shut it fitted so nicely that it was very difficult to see the place of joining.'

" This little fellow, with his cell of hard clay, might more fitly be called a potter than a mason. At any rate he appears to have been also a manufacturer of very excellent strong paper, as well as a builder, and door, spring, and hinge maker.

" Of the French Mason spider, Uncle Philip thus speaks : ' It is found in the south of France ; I did not happen, however, to meet with one while I was in that beautiful country. This kind digs a gallery or hole under-ground, as much as a foot deep. She lines it with a sort of silk glued to the walls, and makes her door which is round also, with many layers of mud or earth, all kneaded and bound together with some of her silk. On the outside the door is flat and rough, to make it appear like the earth around it, and hide it ; on the inside it is shaped like the inside of the door of the spider I have told you about ; and all covered with a coat of fine silk. The threads of this silk are left long on one side, and fastened to the upper part of the hole ; and these make the hinge. There is no spring to this ; but when the spider pushes its door open and comes out, it shuts again by its own weight. If the door is forced open by anyone when the spider is at home, she will catch hold of it and pull it in ; and sometimes when it is half open she will snatch it out of the hand.'

" No wonder that I, a little child, sometimes half suspected that Uncle Philip was telling stories about these Mason spiders ; but it is all true enough, for I have examined their work myself, with astonishment.

" And we know that these trap-door spiders are not the only clever creatures of their race. There is the geometrician who spreads her beautiful net with so much delicate ingenuity and forethought ; she also who weaves a labyrinth of festoons and curtains and galleries of silken tapestry ; the quick-sighted and no less quick-limbed hunter, who, disdaining the crafty net and patient ambush, roams abroad and springs upon his prey—sometimes striped and sometimes spotted these hunters are the very tigers and leopards of the Arachnida.

There is also the diver, who constructs for himself a perfect diving-bell, with which he descends into the water ; and the raft-builder, who sails about and searches for his prey on the *surface* of the waters. And we must not forget the sapper and miner—what various trades these creatures practise for a living !—the terrible Tarantula ; a big, savage, and courageous animal ; who mines and tunnels and funnels his lair in the earth ; and lies in wait with eyes that glisten in the dark like the fiery eyes of a cat. Then there is the tiny aeronaut who sails in the sunshine in a car of fine silken gossamer ; and there, perhaps, fishes for those minute germs of the air which so puzzle the philosophers. What a jolly time the little fellow has of it from the moment when, contemplating the fineness of the day, and the sunny calmness of the air—in which already he can almost float by mere volition he is so light—he ascends to the highest point of grass or twig in reach ; stoops the fore part of his body, and shoots forth from his rifled spinnerules a silken Jacob's ladder ; so light that it bears him in the air, and he ascends with it towards heaven ; and there, while already floating in the sunshine, he forms his silken car, and sails about in a sea of glory. Perhaps there is heredity in this, and it comes of his descent from the Princess of Lybia, the grand-daughter of Phœbus Apollo who himself daily rides in a car of glory across the sky.

“ Said I not well, that spiders are very much divinely endowed ? We call these wonderful faculties of animated nature Instinct. What do we mean by that ? Do we mean a mere natural impulse without reason or knowledge of means and ends ? It is impossible to reconcile the acts of the spider with the supposition that it has no power of thought, no anticipation, no purpose. As to its skill in carrying out its purposes, since it has not been communicated by training, nor even by example, we can only say that the little creature is indeed very mysteriously and wonderfully God-taught. I will speak again about this instinct.

“ It is curious how the Tarantula, without spreading a net at home, and without taking the trouble to ramble abroad, should anticipate and realize the capture of any prey. What is there to attract victims to that funnel which he has set up, at the bottom of which he patiently waits in the dark, ever watchful of the orifice above ? It is just possible that he is a sort of male siren, making some music which, inaudible to human ears, yet ascends from his trumpet to attract his

victims ; and that for the latter merely to catch sight of those ever-watchful sparkling topaz eyes below, is to be fascinated and lost. I strongly suspect that he is a charmer.

"It is also curious to note that the weaver carries in her abdominal work-basket just such a variety of materials as are best suited to the various qualities and needs of her spun-work ; she carries material for net, or trap thread ; nest silk ; thread for the tapestry of her sitting-room ; and floss silk. And she makes no mistake in turning on, and spinning out, just the right material for the right work.

"Now some may object to the spider that, clever interesting little fellow that he is, his habit of catching and devouring flies is cruel and reprehensible ; and that this carnivorousness disentitles him to favour or admiration. We, too, like this fellow-creature of ours, are carnivorous ; and by means of our agent the butcher, are more cruel than he. Rest assured that the spider is perfectly honest, and in order, in catching flies and devouring them ; because he is so mysteriously God-taught so to do. And be it known that the spider does not dispatch his victim with so much rough usage as carnivorous man when he prepares his victims—tender veal and spring-lamb—for the tables of the tender-hearted. When Providence so evidently ordains the carnivorous habit, it is, depend upon it, not a cruel ordinance. After the fright of capture comes a re-action—either insensibility or the pleasurable sense of falling asleep ; either unconsciousness or a drowsy consciousness perfectly painless. Dr. Livingstone experienced this when for awhile he was the hopeless captive of the lion. And these spiders, God-taught to be merciful, do what man wilfully neglects to do when he slaughters his victims for the table of the tender-hearted. The spider, by means of his mandibles, impregnates the blood of his victim with an instantaneously effective anaesthetic—the true pain-killer. Man, too, might readily apply a pain-killer to his victims, without even impregnating their blood with it. It is scarcely a digression, since the spiders have brought up this subject, to say that some years ago I directed the attention of the Baroness Burdett-Coutts to this matter, and that lady recommended it to the attention of the Society for the Prevention of Cruelty to Animals. One objection urged upon me by the Society was that the use of chloroform or any such anaesthetic might deteriorate the flesh as human food. To get this error corrected by eminent authority I put the

question to my late friend Sir William Fergusson, and he replied that there would be no deterioration whatever ; since the proposal was not to kill by means of the anaesthetic ; but merely to render the ordinary death, by bleeding, perfectly painless. The subject was ultimately brought before the International Congress of Societies for the Prevention of Cruelty to Animals, held in London in 1874 ; and a resolution was unanimously passed that the foreign delegates be invited to bring the matter under the notice of their respective Governments ; and that the English delegates communicate with members of Parliament and local authorities, ‘with the object of praying the legislature for a Royal Commission of enquiry into the whole question.’

“ But to this day nothing more has been done. The spider continues to use his pain-killer ; and man continues to refuse to do anything of the sort ; and the voice of the screaming pig is continually heard in the land. Of course in advocating the adoption of an anaesthetic in slaughter-houses, I recommended the employment of only duly trained and certificated slaughtermen in public slaughter-houses. Well, let that pass now ; I have only referred to the matter here to shew that, cruel as we may judge spiderkind to be, mankind is still less kind to his victims.

“ Now, when we consider the wonderful agility of the flies—their powers of avoidance, of tacking, of instantaneous diversion of momentum, as exhibited in their games of tick beneath and against the ceiling of a room on a summer day ; and when we observe the marvellous movements and avoidance of collision in a crowd of gnats in their merry aerial dance out of doors on a summer evening ; it is difficult to understand how creatures endowed with mechanism so instantaneously obedient to the will, should ever dash into a spider’s web. Let us hope that it is only the naughty flies which get caught by the spiders ; only offenders, led and given over by their irresistible fate to the executioners.”

But let me be serious, and interpolate here, in this 1878 paper, the remark that, great mystery as it is, carnivorousness is evidently a Divine institution ; and was so from the beginning of earth-life. Before the advent of man to this planet, its geologic lords were carnivorous. The forms of pre-Adamite life as revealed in their fossil remains, were created with offensive weapons for the capture of prey,

as well as defensive armour ; while some were created with defensive armour without weapons of offence, and others were created without means of either offence or defence, and were evidently intended to be easy victims. It is so to this day throughout nature ; and the members of the latter class—the victims—are the most abundant, proportionately to their service as food to superior animals. The antiquity of this order of things is the Testimony of the Rocks ; and its survival is apparent in the minutest and the noblest reaches of existing animal life. It may be otherwise in other planets ; but here it is not only a divine sanction, but a divine mandate, as well as a divine mystery. It is part of the mysterious natural strife of this life ; natural among the denizens of the air, the land, and every pond, lake, river, and sea. But in its natural operation I do not believe, as already stated, that it means any exceptional suffering or evil. The death inflicted by the carnivora, even on young animals, is only one of the modes of the universal change, indicated by the universal death ; and, at the same time one of the modes of sustaining the life of those whose hour of change has not yet come. The same law seems to prevail throughout terrestrial nature in the divine provision of flesh-food as in the divine provision of fruit-food. In the latter term I include all vegetable produce of food—all the vegetable fruits of the earth. This vegetable fruit is all created as the apparent and possible media of the propagation of vegetable species ; with its seeds its roots or its coronals. But in such excess as not only to accomplish that divine purpose most effectually and completely, and ensure the propagation of all vegetable species ; but to also very vastly feed the non-carnivorous and omnivorous animal world. So likewise the eggs the larvæ and the pupæ of the insect world are all created as the apparent and possible media of the propagation of insect species ; but created in such excess as not only to accomplish that divine purpose most effectually and completely, and ensure the ample propagation of all insect species ; but to also very vastly feed a portion of the smaller carnivorous animal world. And so it is a divine law in all the animal kingdoms of the air, on the land, beneath the land, in the sea, and in every pond lake and river ; with the young, the adult, and the old-aged of species—the strife is, naturally, with all who are subjected to the sway of lordly man and his friend the dog. Because it is evidently so divinely purposed, we may be assured that it is a part of Divine

Wisdom, and even Love ; and one of the means of progress to the mysterious future. And while I thus speak of the change which we call death, no one more firmly believes than myself that There is No death. As to the present life cut short, depend upon it there is more meaning than we know of in the words "for of such is the Kingdom of Heaven" applied to those little ones whom the great carnivorous death of this life has snatched from us, to our great life-long sorrow ; but to their own great eternal gain. The expression reminds me of an old classic proverb—"Whom the gods love die early," or something like that. The natural carnivorous arrangement is evidently ordained for some special wise purpose unknown to us ; because flesh is not necessary to sustain life. The herbivorous digestive organs can extract any amount of strength from vegetable food ; as we see in the horse and the elephant. But man, although truly omnivorous, appears to be especially carnivorous ; and flesh-food seems to be necessary generally for the attainment of his maximum strength and development. I now return to my spider paper of 1878 :

"There were naturalists thousands of years ago, and among them were close observers and mighty thinkers. Spiders had been watched and their divine endowments noted, when that ancient Greek, or, possibly, still more ancient Egyptian, invented the poetic story of the metamorphosis of Arachne. It is merely a poetic way of recording that the skill of the spider is so great as to excel human skill ; and that it is divinely inherited from Apollo ; also that the creation of the spider was especially an act of Divine Wisdom, since Minerva was the Goddess of Wisdom, as well as of the Arts.

"Yes ; there were watchful naturalists thousands of years ago, besides he who wrote this story of the metamorphosis of Arachne. The ancient Egyptians watched and wondered until they believed they had found out God Himself, directly manifesting Himself in animated nature in addition to His celestial manifestation as Osiris, or the Sun. The knowledge, fore-knowledge, and untaught, unimitated skill of the mere insects, were so wonderful and incomprehensible as to appear Divine. King Solomon was both a botanist and a zoologist, and watched the spider that 'taketh hold with her hands, and is in king's palaces.' It is not improbable that he permitted them to dwell and work in his own palaces, that he might study their ways at home as well as abroad. I wonder if his wife, the Daughter of Pharaoh,

ever complained of the spiders, and had them removed in the King's absence ! And he had watched the ants, whom he described as 'a people not strong—yet they prepare their meat in the summer'; the consideration of whose ways he commended to the sluggard, that he might be wise. Josephus says of Solomon, 'he spake a parable upon every sort of tree, from the hyssop to the cedar; and in like manner also about beasts, about all sorts of living creatures, whether upon the earth, or in the seas, or in the air; for he was not unacquainted with any of their natures, nor omitted to enquire about them, but described them all like a philosopher, and demonstrated his exquisite knowledge of their several properties.' It was a sad pity that Solomon, with so much knowledge, and such tastes, fell so desperately in love with the ladies. Had he not done so, but written more books instead, it is very probable that he, instead of Aristotle, who flourished later on in the days of Philip of Macedon, would have been called to this day the Father of Zoology.

"Zoology was already an ancient science before Aristotle, who is styled its father, was born. It is not to be supposed that the great peripatetic philosopher was the discoverer of all he wrote thereon. His record was that of the science as he found it, the accumulated discoveries of preceding ages, with his own additions thereto. It is curious to reflect how much the sciences—zoology included—must have lost in the destruction of the Alexandrian Library. Pantheism is a very ancient doctrine, older than the pyramids; and that is the off-spring of zoology. Anacreon who sang in the days of Cyrus seems to approach the Pantheistic idea in his apostrophe to the Tetrix or Cicada, the chirping tree-hopper: 'Sweet prophet of summer, the Muses love thee; Phœbus loves thee, and has given thee a shrill song; old age does not wear thee out. Thou art wise, earth-born, musical, impassive, without blood. Thou art almost like a God!' Pantheism became the religion of field-naturalists, who, early in the history of mankind, watched the spiders, the bees, the beetles, the wasps, the ants, the grasshoppers, the birds, the gnats, the dragon-flies, and all the inhabitants of the earth and the air. And the early watchers found, even leaving out the spiders altogether, that among these creatures there were carpenters, diggers, tailors, paper-makers, paper-hangers, card-makers, weavers, house-builders, city-builders, doctors, masons, soldiers, sailors, sextons, boat-builders, felt-makers,

slave-holders, emperors, cunning thieves, and what not? And all, perhaps, before man had learned a single one of these trades, or occupations, except those of the diggers, sextons, slave-holders, soldiers, and cunning thieves.

"No wonder then, that early man added to the worship of the Sun and Moon—of Baal and Baaltis, or Apollo and Diana—a veneration for these inexplicably clever little creatures, divinely clever, and full of seemingly untaught knowledge; and regarded them all as so many gods, or direct manifestations of godship. For, even when they resigned themselves to death, did they not provide in a most marvellous, seemingly miraculous manner, for their twenty-fold, hundred-fold resurrection in their future offspring? In those numerous cases where the offspring is posthumous, it is provided beforehand with a nursery suited to its protection; and with store of food suited to its nourishment during infancy; food exactly suited to the infant by the apparent fore-knowledge of its parent; yet, in most cases, by no means the food of that parent which selects and provides it. The operations of bees all indicate, not only thought and knowledge, but fore-thought and fore-knowledge; knowledge acquired, positively, without experience and without external tuition. The carpenter bee not only carves out of solid wood, in a most ingenious manner, the cells or nurseries of its future offspring, all in good time, before her eggs are yet ripe for deposition; but she fills those nurseries with proper food; and in just such proper quantity that by the time her future baby has eaten it all, it is just big enough and matured enough to go out into the world and get its own living. Its last meal consumed, it just gnaws through the thin partition with which its mother fastened it in for its protection when it was but an egg; and there it is; with all the world before it; and sufficiently strong and knowing to enter upon it at once and alone. If it were as ignorant and helpless as the human Topsy under such circumstances, it might well say, from any external teaching it has ever had to make this start in life with, 'I 'spect I grow'd. Never had no father, nor mother, nor nothin'.' But the future career of this little grub will scarcely bespeak such ignorance. Alone it will go its way and thrive; seemingly self-changing from the larva to the pupa state; rising thence as from a tomb, seemingly self-changed to a matured, winged, soaring creature; rejoicing in the summer air, which it traverses with the

speed of the wind to revel in the sweetest and loveliest places of the earth. It feeds like a god on nectar ; on the nectar of blossoms which seem indeed to have sprung from the earth at the bidding of Apollo ; to be—everywhere—the held-forth nectar cups of these aerial beings. It may indeed be said of this bee as of Anacreon's cicada ‘Thou art almost like a God !’ And she too, in due time, will provide for the safety and well-being of her offspring ; whom she will never see nor know ; as did her own mother before her. And it will be a work of joy. And in them and their descendants she seems to preserve her immortality. Man may selfishly, arrogantly, and ignorantly claim that all nature exists but for his benefit ; that all created things are for his use, directly or indirectly ; that even the solar systems, or astral systems, shining in the heavens, shine only to light up his night ; and that all other races of living things inhabiting the earth are provided only for him to eat or to beat ; or to work, wear, and rob ; without remorse or responsibility. But if this little carpenter bee is not an actual god, as Pantheism would have it, yet it is evidently God-cared-for ; apart from any use it might be to man ; from whose dominion it is free. In its first egg-stage it was God-hatched ; and after the larva came forth from the nursery it was God-fed ; and well might the little grub, if a pious little grub, say, with as much right and reason as man : ‘When my father and my mother forsook me, the Lord took me up.’ For God is indeed the Lord of Flies, as well as of Man. It has puzzled some commentators that the ancients should have sometimes worshipped Baal, or the Lord, under the title of Baal-zebub ; or the Lord of Flies. Some have thought that it was a title of contempt bestowed by the enemies of the gentile worship of Baal. Others that he was worshipped as the Lord of tormenting flies, and because able to deliver therefrom. I have always thought that it was originally a title reverently given to the Almighty by those ancient field-naturalists ; who, while wondering at the mysteries of fly-life, yet rejected the Pantheistic doctrine, and regarded the flies, equally with themselves, as the wonderful creatures of God.”

I hope to give the conclusion of this paper in my next letter.

[P.S.—It is curious that while I am finally preparing these letters for the printer, years after they were written, events occur which seem connected with, or illustrative of, matters therein mentioned, which were originally written still many more years ago. Thus while I am

reading through these spider-letters I receive from my generous friend Mr. Mark Wentworth Goss of Peoria, Illinois, a package of American curiosities, archaeological and natural-historical; including the wonderful trap-door spider's house, the spider himself, and also a fine specimen of the Terrible Tarantula; and other Californian creatures. They were all obtained expressly for me by my friend's daughter when visiting California recently. Of the trap-door spider's house and its tenant he writes :

"I send you the front part of a trap-door spider's house. They are found in all the hot parts of California and Mexico. The nests are often three feet long, but the interesting part is the entrance and the door. About the middle of the box, if you look carefully, you will see a somewhat circular mark, and you can lift it with a tooth-pick, or a splinter, and you will see the construction of the nest. No one knows how the spider can spin that web, glue the dirt to it, hinge it and fit it so closely that it is almost impossible to find it in the open plain. On the underside near the front of the door is a little loop, and the spider can hold the door shut, by its means, against a gentle pull. A spider will rush ahead of you and disappear in a flash, on the bare ground; and you look and look; often you cannot find the door. This one is plainer to be seen because it has been handled so much."]

LETTER XXIV.

"SPIDERS, PANTHEISM, AND EMPERORS."—SALADIN AND THREE IN ONE.—THE PANTHEISM OF ANCIENT FIELD-NATURALISTS.—MAN'S IMPOTENT DEPENDENCE IN NATURE, ALTHOUGH LORD OF THE CREATION.—THE LORD OF FLIES, OF PLANTS, AND OF THE SUN.—THE CATERPILLAR AND THE ICHNEUMON.—PANTHEISM BY ITSELF NO THEISM.—EMPERORS.—MARS, MINERVA, AND BRITANNIA.—THE MEXICAN JUMPING BEAN.

20 DECEMBER, 1891.



y paper on Spiders, written in 1878, which I have to conclude in this letter, is not devoted only to Spiders and Pantheism, as seen thus far; its title being "Spiders, Pantheism, and Emperors." So there was something

besides about Emperors. And it was something unfavourable to some of them ; and through them as chiefs of the lords of the terrestrial creation, unfavourable to Pantheism ; that is, as an 'ism understood to be the only, the complete, and the visible Theism in itself ; from the philosopher-God and the emperor-God, so far as the earth is concerned, to the moth, daisy, and moss-Gods ; or several manifestations of the Deity Himself rather than of His Art ; but not only in the sense of His Omnipresence, which Presence we must all admit. Let us pass on from this bewildering mystery. But in denouncing some emperors I am sure you will believe that I do not denounce imperialism as imperialism ; but only its misuse and abuse of power. There cannot possibly be a more loyal and devoted subject of our so justly dearly-beloved Queen-Empress, the august Sovereign of Great Britain, Ireland, Greater Britain, and India, than myself. My denunciation in that paper was of imperial aggression ; which in my opinion is too much regarded as the right of might ; and too soon condoned by nations looking on, when resulting in accomplished fact ; because emperors are emperors ; and their position is so respectable, and they have so much more right than other people to do wrong ; or, as they like ; if they have the *power* to do it. [But those emperors of whom I wrote are now no more while I am preparing these letters for the press, in December, 1894, and against reigning emperors I have not one word to say.] While writing that paper I thought it proper to denounce certain imperial acts, just as I have thought it would be cowardly to refrain from exposing errors in so-called science for fear of being unfashionable and considered unorthodox ; because there is as much bigotry in so-called science, even if it be truly nescience, as in any religion. Of course I do not charge any with cowardice in remaining fashionable and orthodox if they are not able to see the wrong or the error ; even if it be through prejudice. There are many such—bigots but not cowards. Then the majority of people are naturally followers and not leaders ; and they are not cowards for being found under a banner of wrong through force of circumstances which they could not possibly influence or evade. There are some, on the other hand, who, being independent, are rash ; and count their rashness courage. They will fight for erroneous deductions ; and delight in being unfashionable in the blatant maintenance of their erroneous deductions. Take for example that self-styled Saladin and his false

application of his logic. He says three in one is an absurdity. So it is ; and so it is not. "Absurd again," he would say. Yet it is quite true. He takes three anythings—say three stone marbles—and says, "The three cannot be an indivisible one." Of course not. He then takes one marble and says, "The one marble cannot be three complete marbles." This is equally true. Then he laughs to scorn all threes in one ; stony or not stony ; and applies his logic falsely to things not visible and not tangible ; and by no means subject to his poor limited logic. I am not now arguing for any Christian doctrine, but only against the rashness of false logic. It is absurd to attempt to apply the logic of stone marbles to spiritual mysteries—things unseen and intangible. But we have even a visible instance of three in one, in Light. We know that light is composed of the three primary colours—crimson, yellow, and blue ; yet the three compose one white light. Then take Saladin himself : he is another illustration. Even he will not claim to be more than one. Yet he is somehow three in one. As a man he is composed of solid, liquid, and spirit or life. They are each separable ; take either of them away and he is no longer a man ; yet the three together constitute one man. Some applaud the blatancy of a false Saladin as if it were courage and knowledge ; when it is only swagger and foolish rashness. Is it possible that I have been discoursing on Courage to a Gordon !

I will now beg to proceed with my paper on "Spiders, Pantheism, and Emperors" : [partly leaving out the Emperors].

"Now, I intend to glance briefly, but critically, at these two doctrines ; namely, that of the Lord of Flies ; and that of Pantheism ; which latter supposes the flies themselves, and the spiders, and the ants, and the beasts of the field, and all living things—I must not here say creatures—to be direct manifestations of God ; and God Himself ; all put together constituting the living universe and the universal God as one and the same. Only a moment's thought, to my mind, explodes this doctrine. Man, clumsy as he is ; and slow ; requiring a seven years' apprenticeship, and artificial tools, to enable him to accomplish work, the parallel of which members of the insect world go straight at, without any teaching at all from their fellows ; and with no other tools than they are born with ; yet, clumsy and slow as he is, man is undoubtedly the chief of the terrestrial beings ; and, taking him altogether, the highest of all these manifestations.

Although the carpenter bee disowns man's dominion, man is still undoubtedly the lord of the terrestrial creation. And is man a God? Is he indeed the chief of the gods of the earth? Perhaps so, but with a small g at present. But what a poor miserable wretch of a deity!—whether as peasant or emperor. Leaving out the fact that he cannot puff out one single light of all the host of heaven; nor stop or change the course of a single satellite; he cannot even create one single simple polype; nor restore to animation a dead sparrow, though still warm, and with all its organism ready made and complete and lax; nor can he renew his own lost finger; nor, by taking thought add one cubit to his stature. He gets wounded—he is so far ungod-like at present that he cannot help that sometimes—the wound gradually heals up, and new skin covers the place; but *he* cannot tell how the re-creative marvel is wrought. He is full of wonderful organism and mechanism of which, and of whose mode of operation, he is utterly ignorant; except for such scant knowledge as he can gather by cutting up and examining the physical construction of some of his fellow gods; and even then he cannot understand the working of the thing at all. Let me now speak of instinct and the Lord of Flies:

"I have spoken of the insect-artisans as being God-taught; and as being endowed with mind—thought and forethought; knowledge and foreknowledge; the direct gift of God, without the tuition of parent or schoolmaster. But the sceptic; who knows better; will not have it so. He says the trap-door spider, when he excavates his house in the earth, lines it with compact clay, tapestries its walls with silk, and surmounts it with a hinged trap-door; does so by mere natural impulse; without purpose or knowledge of an end to be accomplished. He says also that the carpenter bee, when she carves chambers in the log, and fills them with bread and honey, deposits egg after egg thereon, and encloses cell after cell with their partitions, and makes the passage of exit nearest to her first-deposited, and first-to-be-hatched egg, that her first-born may come out in due time and leave the way clear for his next brother above to descend—all this, he says, is done by natural impulse; without purpose; and without knowledge of the needs of her future young. Well, if the spider and the bee know not what they are about, who is it that does know, and guides them to do these things so properly and exactly and effectually? The sceptic unintentionally leads us at once to the in-

evitable conclusion that there is a Power ordering all these wise and fit doings—a Power independent of the insect operator, working by its means. Yes ; this argument merely transfers the foreknowledge and forethought, and the exercise of them, to a controlling, active, independent Cause ; guiding with wonderful order and precision all such operating creatures with which the whole earth teems. The deposition of eggs by a moth on a twig or leaf most convenient for the food-finding of the future larvæ, which shall presently be hatched, may be due to an implanted pleasurable impulse, taking the form of an instinctive desire to lay eggs on certain substances which turn out to be just right for the larvæ ; just as animals select suitable food and medicine, without previous teaching or experiment ; merely by a sort of pleasurable affinity or harmony between taste or smell ; food or medicine ; and the necessities of the animal. This sort of instinct I call God-teaching too ; and it, equally with the other kind, proves the existence of a beneficent regulating Power, which can cause these fit operations, independently of experience or reason. But the operations of the trap-door spider and the carpenter bee will not bear this same interpretation. It is impossible to conceive the progress of such works without purpose, knowledge of means, and foreknowledge, or expectation, of results, in the worker ; equally God-imparted. To say that these operations are all performed in accordance with Natural Laws does not eliminate from the question the Almighty Law-Maker and Law-Preserver—the Lord of Laws ; who is also the Lord of Flies.

“ And it is all evidently the work and wisdom of God whether the created spider and the created bee work with knowledge and expectation in what they do, or without any knowledge or expectation whatever ; as mere wonderful senseless automatons. Or even if they work by impulse like creatures who eat and drink with appetite and pleasurable gratification ; but with appetite and food and pleasure ordained, not so much for the pleasure, as that the creatures may be perfected in bodily maturity, or preserved therein ; until the object of their incarnation is accomplished. Although we may judge that, as a rule, the fauna on their part eat and drink on account of the pleasurable gratification of the impulse so to do, regardless of the purpose accomplished by the impulse, which in any case is part of God’s Art, resulting in His preservation of His creatures.

“ And that the Lord of Flies is also the Lord of Plants is apparent ;

not only because the plants are made the means of sustenance of the flies and God's other creatures ; but because the plants in some wonderful instances are made to be the house-constructors, and the actual nurses and caretakers of the young flies. It is curious enough that the cuckoo should deposit its eggs in the nest of a granivorous finch ; seeming to know and rest assured that the finch will hatch, nurse, and rear the strange babies. And it is very curious that the finch, being itself granivorous, and feeding only on vegetable food, should yet nourish its carnivorous foster-child with animal food. But how much more curious and wonderful is the fact that the cynips, or gall-fly, goes likewise to the oak-leaf, deposits its eggs thereon, with, seemingly, a curious faith and trust, or knowledge, like that of the cuckoo, that the oak-leaf will become the foster-parent of the baby cynips. And, marvellous to observe, the oak-plant accepts the trust ; and fulfils it faithfully. The oak envelopes the egg with a liquid food which hardens around it, and increases to a sufficient quantity ; when the whole is enclosed in a hard globular shell or house. The larva comes forth from its eggshell and finds itself literally and beautifully housed ; and food-provided ; entirely by the oak. And as with the carpenter bee's store, the store which the oak has provided in the cell—just the right food for the larva—is just the right quantity to nourish it till it shall have strength to go forth ; which it does by boring a passage out of its empty house into the beautiful outer world. We have also in the rose bedeguar a beautiful house ; made and food-stored by a plant for the housing and nourishing of a young fly ! Some will say it is therefore as reasonable to suppose that the plants have thought ; as well as the bees and spiders. But it is nothing of the sort ; and they may find it so by thinking. And the Lord of Flies and of Plants is evidently also the Lord of the Sun. If the plants feed the flies, so the sun feeds both : and the Lord of All nourishes His creatures by drawing their supply of light and warmth from His reservoir ninety-odd millions of miles off. Certainly the *Fool* says in his heart 'There is no God.' Let him make haste to study the spiders and the flies and be wise. If the sexes ; the affinities of sexes ; parental care ; the consequent preservation of species—if the provision of vegetable food ; the mystery of the germination of vegetation ; the spontaneous projection of seeds from their pods that they may be scattered ; the winged journeys of others for their sure distribution widely—if all this

wise and so evidently designed preservation of plants and animals ; if all this harmonious design, purpose, and accomplishment, so strong and beneficent, be the result of Chance, then Chance is but another name for God—for the Lord of Flies, and of Plants, and of the Sun ; and of all the astral systems which evidently exist in necessary union and as one infinite Empire. The endeavour to grasp the great theme is almost enough to crack one's brain-case.

" Now I know that it has been running in the minds of some of my readers—but they would have felt it irreverent to give expression to the idea—that the Lord of Flies is not very economical of His wonderful creations ; but permits very largely their waste and destruction. I suppose I must try to speak about this ; and, at the same time, finish with what I have to say about Emperors.

" Because I promised to say something about the destruction and apparent waste of insect and other life in the economy of nature, I shall not, therefore, presumptuously stand forth as the explanator of the government, wisdom, and ways of the Ruler of the Universe ; or of the mystery of that death, and succession of life, which He has ordained for all organisms. I shall have very little to say on a subject, the full comprehension of which is beyond the compass of human understanding ; for the same reason that a comprehension of Infinity is altogether impossible ; because a larger globe cannot be contained or comprehended within a smaller globe ; the smaller being the human mind. We all know from observation of things around us that the rule throughout nature is a constant activity produced by ever-changing affinities. No condition, whether of the organic or inorganic compounds of this earth, is ever permanent ; but all conditions undergo an incessant course of construction ; destruction ; and re-construction. The carnivorous habit was evidently an ordained habit from the first—long before Man inherited the earth. This is proven, as I have already said, by numerous fossils. It does not follow, as I have already endeavoured to shew, that the ordinance is a cruel one ; and that the assimilation of one animal into another must be preceded by the agony of the victim. The dread and avoidance of danger and death are implanted by Nature, or God's Art, in all creatures for the self-preservation of limb and life ; but it is almost certain that when death is no longer avoidable, a re-action from fear renders the victim insensible of pain. I have already referred to the

case of Dr. Livingstone, whose flesh was lacerated and whose bones were crunched by the lion. Those who are familiar with death-scenes find that the reality has little, if any, of the horrors ascribed to death in the imaginations of the majority of the healthy. I am now speaking of natural terminations of life brought about by carnivorous animals ; or the decay of age ; or even as the consequence of diseases. I do not speak of such artificial deaths as that of the night-long bleeding and moaning calf ; tortured with a prolonged death that its flesh may be more pleasing to the sight of those individuals of the carnivora —the housewife or the cook and the household for whom they cater.

“In providing such abundance of progeny in animated nature, the wisdom of the Creator has provided, firstly, for the sure perpetuation of species ; and, secondly, for the food of the carnivora. And the latter amounts not so much to painful destruction, as to the assimilation of an inferior organism into a higher organism. In nearly all instances, I presume, the victim, turn after turn, is absorbed into a higher order of animal ; and actually becomes a vital, warm, sensitive portion and part of the animal. It is a sort of transmigration. Man, superior to the lion, is not the natural food of the lion ; as he is the lion-slayer. I will quote, for brief illustration of the foregoing remarks, the reference made by Mr Alfred Smith in his excellent paper on ‘Butterflies and Moths’ to the case of the caterpillar and ichneumon : ‘I have collected on the heaths the full-grown larvæ of the large eggar moth (*Bombyx Quercus*) much longer than your little finger, and nearly as thick. They seem fat and lazy and surely are cogitating how they must spin their egg-shaped cocoons. On the way home I look at my captures, and behold, out of the finest caterpillar in my box there have issued some scores of maggots—the poor caterpillar has lost all power of locomotion and dies. The little maggots are the larvæ of an ichneumon, now full-grown, and ready themselves to assume the pupa state.’

“Here the caterpillar is the victim of the young of the beautiful ichneumon fly. The caterpillar is a creature of very simple organization ; though wonderful enough in its muscular construction, since its every movement is regulated and rendered possible only by its elaborate muscular mechanism—and it is probably incapable of much pain. The eggs of the ichneumon have been hatched either in or upon the body of the caterpillar ; and the larvæ have sucked as from

a mother, the juices of its body ; without even injuring its vital parts. But as the larvæ increase in strength and vitality, the caterpillar declines therein ; and grows sleepier and sleepier ; for it is a transference of life which is going on, until at last, when the matured larvæ issue forth, the caterpillar, having accomplished its ordained purpose, loses all consciousness and falls into the so-called sleep of death ; being by that time an almost empty case. It is as though the caterpillar, instead of passing through its ordinary pupa state of sleep to that of the moth, had been slowly metamorphosed into a plurality of ichneumon pupæ, with a prospective resurrection as a family of beautiful ichneumon flies.

"The wisdom and completeness of the arrangements of the Creator for preserving species, and at the same time feeding the carnivora, are evinced in the fact that the actual numbers surviving and reaching maturity, appear to be about the proper number for the convenient population of the earth and the waters. And it is therefore clear that the excess of eggs, larvæ, and crysalids of insects is ordained, not for mature life, but for food—a part of an important natural economy. Thus the conclusion arrived at by the casual observer that the Lord of Flies is not very careful of the preservation of His creatures, and leaves them very much to take care of themselves—very much to chance—does not appear to be correct ; since He especially provides for the pretty uniform successive preservation of the populations of the insect world. And those individuals which pass through all the varied stages of existence, like the carpenter bee which I have referred to, and keep their place among the spared inheritors of the earth, the air, and the waters, may, therefore, be properly described as God-fed and God-cared-for. I will now leave the reader to think further for himself on this ample subject, and will pass to the conclusion of this paper by speaking about Emperors.

"I think I have shewn that Pantheism by itself is no Theism at all ; because of its chief theoretic God being man ; who is evidently, at present, no God at all, except with the small g, with which we distinguish the gods of the heathen ; no God at all, whether peasant or emperor."

And the emperors who make dishonest and oppressive war and exercise cruelly their so-called right of might, are less god-like than the honest intelligent Christian peasant. The dishonest

emperors who scheme to let loose upon flourishing and beautiful lands and their peaceable inhabitants, the carnage-dogs of war, and fiery desolation, instead of being accounted direct manifestations of the beneficent Deity, the highest terrestrial development of Pantheism—human Gods and Lords of the Pantheon—are, instead, part of the mysterious principle of evil, manifesting selfishness in opposition to divine Christian Charity; and are the enemies of humanity and justice. [But while re-writing this page for the printer in December 1894, I fully believe that such an un-Christian emperor does not exist at this moment.] So this phase of Pantheism will not pass at all. And you will perceive that it fails, not in attributing Omnipresence to the Theos, but in confounding the universal creature with the universal Creator, and the subject of Divine Power with the Creative Power Itself. And it is my opinion, and I am sure it will be yours also, that not only is man not at present an individual member of terrestrial Creative Godhood, or Pantheism, whether the greatest philosopher or the greatest emperor; but that he is not so in his utmost collectiveness; and that if it were possible for all mankind together throughout the whole earth, simultaneously to express one universal creative wish or thought, it would be all in vain. Then how presumptuous appears the pretence of any man to be the actual ambassador to his fellow men, of the Creative God of all the earth, and the sun, and of all the Starry Heavens! And how presumptuous appears the pretence of any man to have the right and power with his fellow men, to interfere in their offences against God, and to forgive and blot out, or leave unforgiven and unexpunged offences committed—not against himself—but against the Creative God of all the earth, and the sun, and of all the Starry Heavens!

This subject of man's dependence upon a higher Power brings to my mind Homer and his "Iliad," and his Trojan prince Alexander, or Paris, the abductor of Helen, the wife of Argive Menelaus. The poet generally gives Alexander the prefix "godlike," without, however, any signification of godlike Power or Goodness, but only of physical beauty. And Homer makes him repudiate in his own speech any claim to the title in the sense of Power. In the third "Iliad" Paris is represented as retiring in cowardly fear before the approach of Menelaus, whom he had vauntingly challenged to combat. And it is written :

"Thus Menelaus rejoiced, having beheld with his eyes godlike Alexander. For he thought he would be revenged upon the guilty wretch : forthwith, therefore, with his arms he leaped from his chariot to the earth.

"But when, therefore, godlike Alexander perceived him appearing among the foremost warriors, he was smitten in his heart, and gave way back into the band of his companions, avoiding death."

Which his noble brother Hector perceiving he upbraids him, saying, among other bitter things :

"Couldst thou not have awaited warlike Menelaus ? Then shouldst thou have known of how brave a man thou dost possess the blooming spouse. Nor will thy harp, and the gifts of Venus, and thy hair, and thy figure avail thee, when thou shalt be mingled with the dust." A part of Alexander's reply is :

"Reproach me not with the lovely gifts of golden Venus : the distinguished gifts of the gods are by no means to be rejected, whatever indeed they give ; for no one can choose them at his own pleasure."

But notwithstanding this sort of ungodlike-ness of the sons and daughters of God who are the appointed lords and rulers of the inhabitants of this planet, there is another phase of godlike-ness besides that of beauty ; and it is even one of power, though not the Divine Power of Creation and Preservation. It is the power of terrestrial mastership—a power of mastership over all his visible fellow-creatures, divinely ordained to man at his creation. That also is hinted at by Homer when he so often alludes to the Trojans as "the horse-breaking Trojans." It is this power of mastership of the earth—God-given power—which makes man on the earth comparatively godlike ; but only with the small g, and in no Pantheistic sense. My paper on the aggressions of emperors thus concludes :

"The ancients had their Minerva ; a goddess of War as well as of the Arts and of Wisdom. But not of that war which was personified in Mars—the foster-child of Thero or Fierceness—the wild steeds of whose war-chariot were Flight and Terror ; driven by the Furies. This Mars was the only god of the aggressive North, whose barbarous Scythians were ever swarming southward ; the scourge of civilization. But Minerva was the goddess of that War which was waged that Peace might follow—the chastisement of aggression. There seems to have

been no belief in Minerva among some emperors. And indeed this goddess of War might have been altogether forgotten in this age of ours were it not that on every bronze coin of this realm she is represented sitting upon a rock in the ocean ; bearing a triple-pointed spear or trident ; and leaning upon a shield on which the badge of England has replaced the snaky head of Medusa. She is now styled Britannia, and her old name of Minerva appears to have been almost forgotten."

[P.S.—THE JUMPING BEAN OF MEXICO. In a postscript to the letter preceding the above I had occasion to mention the timely receipt of gifts from America curiously illustrative of some subjects of that letter. And while preparing the earlier pages of this book for the press—by desire of the science-loving lady the addressee, and of those of her distinguished circle who had read the series in manuscript—I received from the same friend, Mr Mark Wentworth Goss of Peoria, a couple of those remarkable Mexican Beans known as "Jumping Beans," "Dancing Beans," and the *Carpocapsa Saltitans*, or the Jumping Fruit-case. These wonderful things reached me so timely for the opportunity of careful observation before having to hand the foregoing letter to the printer, that it seemed as if some friendly watchful genie might have suggested to my American friend the thought to despatch them from Peoria on the 15th of last August (1894), to be received by me on the 27th of that month, and now, just four months later, to be referred to in this postscript to the letter which especially comments upon the marvellous and so effective services which are rendered by so many members of the vegetable world, in the housing, hatching, and nursing, of the helpless young left entirely to their fosterage by some insects. I am writing this on the 27th December 1894, so have had just four months already for observation, which has never been interrupted during that period for one day or one night. The beans have been carried with me in a little box wherever I have gone for the night ; weekly, nearly, from Staffordshire to Cheshire and back ; and sometimes to the seaside. And while I am writing this they are still shuffling and dancing before me on a sheet of my manuscript—a sheet of memoirs of themselves—under the enlivening influence of the light of my midnight lamp. I thought to have said all that I had to say about them in this postscript ; but it has proved to be so much, that I find the appen-

dage would be even much longer than the very long letter itself. I am therefore reserving the subject for a separate letter, to be printed towards the close of the volume, when my observation of these wonderful things will have been completed in the completion of their own wonderful bean-career.]

LETTER XXV.

THE CONSTANT STRIFE IN TERRESTRIAL ANIMATED NATURE.—LIFE A STAGE OF PASSAGE FROM SOME OTHER STATE TO SOME OTHER STATE.—THE BATTLES OF DOVES AND LAMBS—THE PRE-ADAMITE WARFARE.—THE PURBECK GEOLOGIC FOREST-GROUND IN DORSET.—ITS TERRIBLE FAUNA.—MAN'S SUCCESSION TO THE LORDSHIP WITH THE COMMAND TO SUBDUE.—HIS WONDROUS CONQUEST.—A GROUP OF ZULU WARRIORS.—THE CONSTANT HUMAN STRIFE.—STORY OF THE CONVERSATION BETWEEN THE SPIDER AND THE FLY.

10 JANUARY, 1892.

F not curious thoughts, certainly thoughts of curious facts arise from the panorama presented in the last two letters. There is the constant strife ; that is, and ever was the universal rule in terrestrial animated Nature ; leading so largely to what would seem premature temporal death ; and seeming to shew that the temporal condition is indeed, from the first, only intended to be a very temporary and progressive condition—a mysterious stage of passage from some other state to some other state. We are mistaken in regarding doves and lambs as instances of perfect peacefulness in animated Nature. I have seen doves fight doves of their own family most bitterly, with long sustained strokes of the wings and pecking of beaks, resulting in serious disfigurement and the shedding of blood. I have also watched lambs, only a few days old, fighting like furious little bulls—by no means in play ; but in bitter anger ; and even with “science.” And how came a clumsy lamb, not more than ten days old, to know anything about momentum—the momentum of the battering ram ? But

he did ; and applied it effectually in battle. It was at Llangollen that I watched the battle. And I was amazed to see the little fellow, with more than average lamb-science, perhaps, draw himself backward from his adversary—a much bigger fellow, quite a month old—step by step of his clumsy black legs, about five feet in distance, with his eye steadily fixed upon the foe, and head lowered in battering-ram fashion ; and then he suddenly rushed forward at his utmost speed ; and butted with all the added force of impetus. I waited and watched for the final result, which was, after a succession of these spirited attacks, the ignominious flight of the thirty-day old from the superior battering science of the ten-day old.

Then we referred to man's predecessors in the lordship of terrestrial creation—and he certainly had predecessors in that lordship—and how they ruled by means of naturally furnished weapons of offence and armour of defence ; and ruled only by the superiority of these things. I have referred to some of these pre-Adamite lords in one of my geological papers written after a visit to the neighbourhood of Poole in 1868 or 9, thus :

"The site of this Purbeck forest-ground, now so barren and bleak, presents numerous evidences of having enjoyed a full tropical clime and luxuriance during the secondary and tertiary periods. Messrs. Pike have found, sixty feet below the surface, leaves of palms and other tropical trees of several feet in diameter, and with stems as thick as a man's wrist ; all overwhelmed in their crisp freshness ; and, therefore of local origin. And, from the numerous fossil bones discovered lower still in the secondary deposits along this coast, we are assured that beneath the cool broad shadows of ultra-tropical foliage, and on the banks of rivers now obliterated, have basked the huge creatures of pre-Adamite times. Man follows their extinction ; and by these discoveries of the preceding natural history of the locality, is enabled to visit in imagination the restored scenes ; to roam over its carpet of most delicate ferns ; beneath the shades of the groves and forests of palms, coniferous trees, and cycadeous plants ; and to contemplate without fear the vision of these gigantic proprietors of the land. There was the terrible Plesiosaurus lying in wait in the dense jungle of the river-side ready to stretch forth its serpent-headed neck when the prey came within its long range. On the same banks the hideous Labyrinthodon, a frog larger than an ox. Also the huge

Megalosaurus ; the powerful armour-plated Iguanodon ; and the spike-backed Hylæosaurus. And at various periods have flourished here the Palæotherium, Dichobune, Microchærus, Spalacodon, and Lepidosteus ; as well as the elephant, the crocodile, the alligator, and the turtle. And near Plymouth and Torquay have been found remains of tigers, hyænas, bears, elephants, and rhinoceroses ; geologically of recent date ; but strongly suggestive of a state of life and climate differing from our present."

It may be interesting to you to exercise your imagination upon these things ; seeing that certainly the very spot of your present residence was once part of the populous tropical lordship of these armed giants of the ancient earth ; these predecessors of man. Most of the mighty Saurians disappeared before the advent of man. But he succeeded to their lordship of the earth while it was yet tenanted with fierce creatures who disputed his sway everywhere ; claiming to themselves its forests, its jungle, its plains, its mountains, its caverns, its rivers, and its river-banks. And this strife—this mystery—was then ordained ; the command being given to man to subdue the earth. And his success proves that command to have been Divine ; conveying the power.

It is the most wonderful thing in all Natural History, that all the savage fierce powerful creatures of the earth, with all their formidable arms, and their armour of thick hide, or plates, or scales, fur or feathers ; and superior strength, should have yielded to the lordship of a creature who has no natural arms of offence, and no natural armour of defence—not so much even as the dog, or the lamb, or the dove ; no formidable snap-trap of a mouth ; nor protection of even feathers or of wool. Yes ; it is indeed wonderful that the lordship of the earth should have become the accomplished inheritance of such an easily vulnerable, and, naturally, wholly unarmed creature ; with no wings ; with less speed of pursuit or flight than a fox ; and less strength than a horse or an ox, if we are to believe that. The tenderness of the nakedness of mankind must not be all attributed to the effects of civilization and its artificial clothing. I have contemplated with great interest a group of Zulu warriors—samples of minimum deterioration from primitive physical manhood—the ghastly scars on whose noble limbs were evidences of their physical tenderness ; as well as badges of victories over powerful and armed foes. They

and their ancestors wore no other artificial clothing than the robes of lions and other savage and powerful animals conquered by them in battle or the chase. To such an unarmed naked creature was given the Divine command to subdue the earth. Why need we doubt the Divine command, since it has been so divinely accomplished? And the earth is subdued indeed by its appointed lord. With the command was given the triumphant power, and, behold, it is fulfilled.

We have contemplated the wonderful ingenuity of the spiders and the bees; and pronounced the human apprentice, with all his lordliness, clumsy compared with them. And it is true that the neat and speedy spinning and weaving of the spider; without any apprenticeship; is superhuman. But man, born without tools; and having to make them all for himself; is, in his universal work, "super" all animated terrestrial creation—born naked, weaponless, and feeble, yet in the Image of God. But it would be too absurd to suppose the Image of God to be the image of corporeal man—with fingers, and finger-nails, toes and toe-nails. The expression does not mean that. It means god-like. And is not that comparatively true? Not as compared with the Infinite God; but as compared with man's fellow-creatures; whom he rules in spite of his tender feeble figure opposed to natural formidable arms, plate-armour, and immensely superior physical strength. Such rule by the naturally naked and feeble appears miraculous; and by special Divine ordinance entirely; and not by any mere self-sustained god-like-ness of man.

"Then, to return to the subject of the mysterious universal strife; there is the still more mysterious special human mutual strife; which no strong national laws of human rights and peace, no international codes and courtesies, no Christianity even, have at present abated. The forms, etiquette, and manner of the strife, only, have changed; and it continues as if it were indeed a law of life; employing the highest genius and the most determined industry of the human intellect. This may sound something like an excuse for the Mars-like aggressive emperors, the leaders of the human strife, for the strife would continue without them. But no! There is still the right and the wrong in the strife; represented by the Mars and the Minerva ideas. There still remains the great mystery of the permitted strife of aggressive evil; and the consequent strife against it. I have no doubt that this mystery, at present unfathomable, will be solved and

cleared up satisfactorily to our sense of justice in some future state. But, meanwhile, Woe to those through whom the evil comes! Perhaps their woe will be the having to be "born again" until they are purified of evil, and themselves ultimately join in the strife *against* it; until it be at last all conquered by all-powerful eternal Peace; and there shall not be left one weary soul more to sigh and sing that prayer which I quoted in a previous letter, and which I love:

"Come, gentle death, the ebb of care;

The ebb of care, the flood of life!"

Then we have been glancing at the Folly of the philosopher who says: "There is no God," and that reminds me of my promised—

STORY OF THE CONVERSATION BETWEEN THE SPIDER AND THE FLY.

I think I mentioned that the place of this chat was the Promenade-Concert-Hall which connects the great Conservatory of the Winter Gardens with the Theatre, at Southport; and that the Hall contained a fine Orchestriion, or monster Musical Box, in itself a splendid automatic band of all sorts of musical instruments, excellently well played when wound up and set going. The time was about 5-30, in the afternoon of a fine summer day; after the Orchestriion had been playing a selection of music to an unusually large and appreciative audience. Our spider, having finished darning some holes in her tapestry, was waiting on a little ledge in a corner beneath it in patient watchfulness for some gift from Providence; for she would take nothing but her own, so given; and that was only all that which came into her net. A conceited fly, just on speaking terms with the spider, knowing her honourable nature, and avoiding the tapestry without the slightest difficulty, alighted on the little ledge before her. The spider as usual opened the conversation with an allusion to the fineness of the weather. It is curious that we should have inherited, right down from primitive man to the present day, this habit so generally of making reference to the state of the weather as the preliminary of conversation. The spiders must have inherited the same from their ancient mother; which is also curious, and also carries us back. Thus it was that primitive men, after they had begun to hunt one another as well as the wild beasts, and when it had become so easy to rouse a quarrel, secured temporary peace and harmony in their initial daily utterances to one another whatever might follow later in

the day. It is just possible that you may never have thought of the perfectly pacific and soothing meaning, and original object, of these remarks about the ever-evident state of the weather. On consideration you will perceive that they are statements which will not possibly admit of contradiction, or even disputation, and are therefore subject-matter least of all calculated to lead on to a deadly duel. In the bitter winter while wading through the snow one is saluted with the information "Heavy snow," or "Very cold." Who can deny that? It is evident truth and rouses no contradictory spirit. Then in March, while struggling through the blast and holding our hats on we are informed that it is "Very windy;" and in April that it is "Very showery;" and on a fine day in May that it is a "Lovely day," and "You hear the birds?" Which nobody can deny in a sweet country lane.

Thus the fly raised no objection to the "Fine day!" of the spider. But it was another matter when the spider passed beyond the peaceful initial statement, and proceeded to observe that the fineness of the day had brought out a greater number of the gods than usual. Now the fly had been stroking down his coat-tails—or brushing his wings perhaps I should rather say—with his face half-turned from the speaker, when, at the mention of the gods, he instantly jerked himself round face to face; like the old Duke of Wellington in his stiff stock with his hands behind him, turning suddenly round with a jointless neck, to reply to some speaker. "The gods?" replied the fly—"Oh, I remember, you have spoken of them before. They are visions that appear to you in your solitude. You must have been dozing and dreaming again."

Spider. O no! I have had all my eight eyes open all the day, I assure you; and seen hundreds of the gods pass in and out. There are some here even now; and there is one close by listening to us.

Fly. Well, I have more than five hundred eyes to every one of your eight; and could never close one of them if I wished to; yet have I never seen a god in all my eternal days.

S. And yet do I not only see the gods daily and constantly; but daily do I see you taking shocking liberties with them; which I, knowing them and fearing them, dare never do; although I am so much larger and more powerful and more cunning than you; and armed with mandibles to bite.

At the word "bite" the fly instantly jerked backward as though

bitten ; but as instantly recovered his composure ; remembering the natural honour and honesty of spiders ; and replied :

" Pardon me ; but you have really only seen visions. I have never seen one of them during all the ages of my eternal life. And my thousands of eyes reveal to me *everything* ; and my swift wings carry me *everywhere*. I am a philosopher ; always examining all things ; and never sit moping."

And these observations of the fly are quite true. He is indeed a great philosopher ; and what he knows towards life's close should be something wonderful ! From the moment he breaks through his pupa-case—which he instantly begins to toss about and examine—to the last moment of his last day ; his life is one constant course of enquiry, investigation, and acquisition of learning. He is at any moment ready to risk his life in search of knowledge ; as everybody knows ; and especially cooks, who have the control of ovens. In fact his thirst for knowledge and all other drinks of all sorts is simply insatiable. The little house-fly is indeed a very great philosopher. Still he has some brothers who are fools ; as other philosophers have ; but *they* naturally belong to the spiders, for whom they were created. The legitimate inquisitiveness of the fly is admirable enough ; and a spider, always honourable, respects it ; but as to its wisdom, the line is drawn at the spider's web, and when the fly undertakes to examine *that*, the spider's respect is changed to positive doating. Such flies were the gift of Minerva to the children of Arachne from the moment of the Metamorphosis.

" Yes ; I am a philosopher," continued the fly, " and never sit moping as you do here ; seeing visions of gods. How can you, sitting here and seeing visions, with the paltry number of eight eyes to my four thousand, and with no wings—seeing nothing but your illusions, and going nowhere—how can you know better than I ? "

S. Won't you step in ?

F. No : *thank* you.

S. Well ; then let us talk as we are. And if I might say it, without seeming uncivil, I should say you have too many eyes ; and move about too rapidly ; and sit moping, as you call it, or *thinking*, too little ; to learn much. With one single eye only, and watching with it here as I do with my eight, you would certainly see the gods ; and fear them too.

F. I cannot see that.

And then he turned half aside ; out of politeness ; and began to work with his arms as though he were washing them vigorously with soap and water, from fingers to elbows ; using his hands instead of a sponge ; only, besides no sponge there was neither wash-hand-bowl nor water nor soap. Still he vigorously kept up the show ; rubbing the left arm with the right hand, and the right arm with the left hand ; any other course being impossible ; from wrist to elbow. Then he seemed to wash his head just as vigorously with both hands—with such energy that one would have supposed him to be dealing with a heavy and dirty shock of hair. In fact so smartly did he rub, with both hands and arms at once that the wonder was he did not tear his little red head clean off. It seemed nearly off several times. But although he seemed thus to be washing his head ; and nearly tearing it from his thin thread of a neck ; he was merely polishing his more than four thousand lenses of eyes. Having accomplished which he turned to the spider again, repeating : “I cannot see *that*.”

“ Cannot see what ? ” asked the spider, who had lost the thread of the discourse in watching that thread of a neck ; so near being “erased,” as the heralds have it.

F. Why, I cannot see that I cannot see. With a head that is a complete jewel set with thousands of eyes of brightness ; just fresh polished ; and full of the knowledge of an eternal life of enquiry and investigation ; surely I must be able to see better than you with one eye, or you with eight eyes.

S. Prove it then. Do you see any of the gods in this Hall now ; with your four thousand eyes fresh polished ?

F. No ; certainly not ; because there are no gods here nor anywhere.

S. Then your sight must indeed be very bad ; for I do distinctly ; and there is one close by, listening to us.

F. Oh, come ; that's a good one !

S. It's true : and I dare not come out to you for fear of him. Won't you come in ?

F. Not to-day, thank you.

The flies are safe enough outside the spider's premises ; but when once inside, it is lawfully understood that they are the gift of the Gods to the children of Arachne. That is spider-law ; and the

invitation to "come in" generally followed some special bit of insolence on the part of the fly, arousing anger.

S. Then let us talk as we are. It is remarkable that you cannot see the gods when I myself see you so often taking liberties with them, and teasing them.

F. What ! teasing the gods ? That's enough.

S. Yes ; you are constantly at it. This very day I have seen you vexing them by sipping, uninvited, the nectar which gently springs from the pores of the divine epidermis.

F. I have certainly been sipping nectar wherever I have found it in many many *places*. But I know nothing of the divine Epidermis ; and do not believe that there is such a person. And I am sure there are no gods ; or I must have seen them. And now I hope you will excuse me if I say, in all friendliness, that I really think you ought to have some advice. You have such strange ideas ; and see such strange illusions. And they all come of your sitting here brooding ; with nothing to do to amuse you from morning until night, but a bit of darning now and then ; and a meal of raw victim at very unequal intervals. It's dreadful to have such fancies—fancying you see such dreadful sights. I should certainly advise you to consult a doctor.

S. What a long spell of advice for no fee. Will you come in and feel my pulse, and earn a fee ?

F. No no ; thanks. You don't want me ; or, at least, I am not your doctor. It is doctor Wasp you want to rouse you up a bit.

S. Thank you. Then let us talk as we are. But I wonder you are not afraid of some terrible judgment happening to you ; talking as you do out there in the hearing of the gods.

F. There's just where it is you see. If there were any gods ; and they had any power ; and we teased them ; don't you think they would strike us dead ?

S. The gods are too magnanimous as a rule to kill every offender for his silly offences. They are too great to be always moved by things so small. But judgments do overtake some of you every day for your blasphemies. I think it very likely they may kill you at any unexpected moment.

F. That's another good one ! You say that I am constantly teasing and vexing and tickling the gods ; and that some of us are being killed for such conduct every day ; and here have I been living

eternal life unharmed ; and have never seen a god in all that time—or, rather, eternity.

S. It is all a part of your short-sightedness. So late as yesterday I saw one of you killed for persistent impertinence. The deceased insisted on sipping the nectar from the shining face of one of the gods who stood near here listening to the Orchestrion. He *would* return again and again, and walk on the divine nose ; after having been repeatedly warned off by the divine hand. At last I was shocked to hear the word “*demmit !*”—a word which some of the inferior gods utter when they are angry—and your friend was tapped with a touch so quick and true ; that he dropped crushed and dead to the earth. Now a second before this happened, that fly could have boasted as you have just boasted—of eternal life too ! Of course you have too many eyes to have seen it had you been here.

F. Of course I have ; as you use that tone. It is a part of your daily hallucination.

S. That's a hard word. But come in and I will shew you a thing. You know—but you don't know : but I insist upon telling you that those whom the gods slay in their anger are gifts to the children of Arachne ; although strangers sometimes rob us of them. So I watched my opportunity ; and as soon as the way was clear, I fetched the body up here. The wings only are left now ; but they are a fine pair ; and I have them standing in a corner here against the wall. Come and see them for yourself.

F. Thanks very much : not to-day.

S. Then let us talk as we are.

F. Passing from this ghastly subject ; you referred just now to the gods listening to the Orchestrion. Do you make out the Orchestrion to be a god—or, perhaps, the God of the gods ?

S. No, indeed. The Orchestrion is the work of the gods. I have watched them working at it. It is by their means only that it gives out music.

F. Dear, dear me ! You should really take some advice. Seriously.

S. Then what do *you* make of it ? I suppose you *have* seen *that* ; and heard it ?

F. O yes ; and have been inside it ; and up and down every trumpet and pipe of it ; and have danced upon its drums ; tam-

boureen ; and cymbals. It has always been my habit to examine things in general very closely. Few things escape me ; and especially do I love to examine the *insides* of things.

S. And what do you make of the Orchestrion ? Do you think it made itself ?

F. What do you make of your gods ? Do you think they made themselves ?

S. That puzzles me. I can make nothing of it. I have given it up.

F. Of course. Because there are no gods to make anything of. But here *is* this Orchestrion ; and it does not puzzle *me* at all. It works by means of fixed Laws. There is no reason for the existence of gods. There is nothing for them to do. They are not wanted. For all things work by means of fixed laws ; from the beginning ; this Orchestrion included.

S. Yet I can assure you that I constantly see the very gods working at this Orchestrion ; changing the tunes ; winding it up ; setting it going ; and repairing it when out of order.

F. Again I beg your pardon. It is never out of order. It is a sort of "clock, so perfectly constructed from the beginning as to require no outside interference during the time it has to run to keep it going with absolute correctness." I have examined it very often. Dear me ! what a fright I had inside it yesterday ! I will tell you : I had descended into the depths of one of the upright trumpets to see how far it reached ; when suddenly its law of operation commenced to act ; and in an instant I was blown up clean out of the trumpet like a spark from the funnel of an engine ; and dashed against the top of the case. Talk of a spark ! Why every eye in my head seemed to become at least two bright sparks ; and in one instant, all at once, I saw at least eight thousand sparks. I shall never forget its law of operation commencing to act. I ought to know.

Then the fly again went through that operation of washing his hands and arms up to the elbows ; then rubbing his red head so vigorously as nearly to pull it clean off ; and both I and the spider with a start thought the little short thread of a neck had really snapped a time or two. "Now I feel comfortable" he said, when the fresh polishing was done.

S. That's a blessing. Now let me tell you that while you were

examining inside, *all in the dark*; I was watching outside, in the light: and I saw the god-in-charge wind up the Orchestrion, and set it going. And that was how you got shot up in the air; and came to witness those eight thousand stars. I have watched that winding up and turning on, followed by the crash of music, for years.

F. Years? What do you mean by years?

S. The combined seasons of summer and winter; of warm and cold; of dull and bright.

F. O, you mean days and nights.

S. No: I mean years: whole seasons of hundreds of days and nights: years.

F. There are days and nights; hundreds of days and nights; but no years. There you are wandering again. During all my eternal life I never before heard of years.

S. No: your eternal life never lasts *one* year.

F. Well: if I did not know that you are poorly; and to be pitied; and wandering in all you say this afternoon; I should feel hurt at that remark. Why I can remember ages, and ages upon ages, of my life; and, study how I will I cannot see any end to it. It is eternal. There is one event in the very very dim distant past, however, which I cannot get beyond; although I know very well that I was living before that. It is only a question of memory. I remember waking up from a very deep sleep; and cannot remember beyond that. It was very curious. I had been sleeping inside a brown bolster-case with no seam to it. However I got into it I have never been able to make out. But I remember waking up inside it; and struggling until I burst an end out of it; and squeezed through. I was rather faint with the effort; and I very well remember lying on my back after that, and turning the bolster-case about with my hands and feet; and playing with it; and examining it; until I felt strong enough to throw it aside, and fly away with a good appetite for my breakfast. Of course I was eternal before that; and had only been sleeping heavily. But that sleep destroyed my memory of all the infinite past. And that awaking took place ages, and ages upon ages, ago. Speaking of a good appetite for breakfast reminds me that I have been talking here until I find I have a good appetite for my tea. So, good evening.

S. Good evening! Perhaps you will call again for a chat to-morrow.

F. Thank you. I CERTAINLY WILL ; and trust to find you better.

Even on the way to his tea as he calls other people's provisions, socialist that he is, a fly cannot resist the investigation of anything that may present itself in the way between it and him ; and as I stood in the bee-line from the Corner to the Refreshment Stall, the fly alighted on my waistcoat ; and while he was examining the buttons ; the pockets ; the quality of the cloth ; and the tailoring generally ; I was conveying him to the stall, where he immediately alighted upon a bitten bun crusted with sugar. It was the property of the wife of an honest working-man at my elbow ; who, seeing the fly busy at the bun remarked to her that the flies were *uncommon* cheeky at that place ; and had plagued him badly both yesterday and to-day.

The fly might have heard the remark for he instantly forsook the bun, and impudently ascended to the mechanic's shining nose.

"Demmit !" said he, " how they tickle." And he tapped our little friend with a touch so quick and true, that he dropped crushed and dead to the floor ; and the little infidel never kept his last solemn promise to the spider. Thus perished, in the height of his conceit and presumption, one who was truly the Agnostic *who does not know* ; yet thinks he knows better and more than anybody and everybody else ; and applies the Don't-know-ism to everybody but himself.

Now, the moment you heard that shocking word of swear which had been uttered yesterday by one of "the inferior gods," as the spider opined, you thought that surely Mr. Mantalini must be in Southport. But we see now that the expression did not come from an inferior god so miserably inferior as he ; but from one of the noblest of them—from a rough Tubal-cain ; a human Vulcan—so much nearer the Image of God than a mere wretched piece of false show ; that he could with his own hands make a steam-engine ; and all the tools and weapons that make man god-like in subduing the earth ; but he could make no spider's web with any amount of education. And yet the fisherman who makes and erects his fixed perpendicular nets in the sands at the edge of the low-tide wave ; to catch the fishes who pass thereby on the fin at high-tide ; exhibits all the arachnidal skill that is requisite for his maritime arachnidal pursuits. It is indeed quite a spider-like contrivance ; and when the tide retires there is the web dotted with its captured silvery

maritime flies.

But as to the spider's own inimitable web, it brings us again to the thoughts which I fear have not been sufficiently clearly expressed ; respecting the divinity of the work of the uneducated insect ; and the superior divinity of the work of educated man. In regard to the spider with its inborn wonderful ingenuity ; acquired without external teaching or a moment's experience of apprenticeship ; we might well say of it as Anacreon of the Cicada "Thou art almost like a God!" And we may indeed say that in comparison to such a worker and work, man is indeed clumsy. But, so far as we know, the spider cannot be taught ; nor acquire any other than its inborn skill ; and it is in contrast to this that the image of God, or god-like-ness, appears in man, who, being born so feeble, weaponless, toolless, clumsy, and ignorant ; is yet capable of acquiring so much more power and skill and knowledge than any other denizen of the earth. Then is it godlike to be ignorant and require tuition and tools and practice ? Not at all. But this capability of instruction and acquisition and conquest in feeble, vulnerable, toolless, weaponless man, exalts him, when his possibilities are developed, to the comparative position of a terrestrial god among his fellow creatures. And there his god-like-ness ends ; for the present. We may not say for ever !

As to the adventure of the spider and the fly, I fancy I hear you say, as you put this letter down :

"What a STORY he has been telling me !"

Very true.

LETTER XXVI.

HAMLET : "WHAT A PIECE OF WORK IS A MAN!"—WOMAN.—LITTLE HELEN KELLER FROM WICKED TEXAS.—GOD-LIKE-NESS AGAIN. THE DOG'S LIMIT OF MIND.—THE DIVINE POTENTIALITIES OF A HALF-CREATED GIRL.—THE HAPPY DOG AND THE WRETCHED DONKEY AND HORSE.—CHARLES DICKENS AND THE VILLAGE DOGS.—DOG AND MAN KINSHIP.—DEAF DUMB AND BLIND HELEN KELLER WRITES A FAIRY TALE.—HELEN'S IDEAS.—DICKENS AND THE BLIND DEAF MUTE OF LAUSANNE.—HELEN'S DREAM.

26 FEBRUARY, 1892.

AFTER so long a period of enforced literary idleness, during which that Fiend called Influenza and his baneful attendants and followers have held me in their “grippe,” I at length essay to resume the review-letters, wondering whether there will remain the power or not. I was just about to open the book “Modern Science and Modern Thought” to look for my next Text, when glancing at the “Shakespeare Calendar” which hangs on the wall, I perceive beneath the date “February 26,” the following quotation from Hamlet ii. 2 :

“What a piece of work is a man ! how noble in reason ! how infinite in faculty ! in form and moving how express and admirable ! in action how like an angel ! in apprehension how like a god !”

I do not remember ever to have seen this passage before. Had I remembered it I should certainly have culled the flower and enclosed it to you in one of the later letters ; to the subject of which it belongs. But the “angel” simile belongs more to woman than to man. Woman is the prototype of the ideal angel ; of whom and of whose form we know nothing ; but we give him an ideal resemblance to the sweetest and most divine form of which our conception is capable—woman ! If we conceive masculine angels they must be little children ; of such being “the Kingdom of Heaven.” The rough man must become feminine to accord with our ideal angel. Even our ideal St. Michael is a sort of Joan of Arc.

And, curiously enough, I have before me a letter from a distinguished American friend, which came during my indisposition ; and as it involved a good deal of reading and thought, has remained, not only unanswered, but unread ; only glanced at, until now. And taking it in hand just now, I find that it is on this same subject ; this “piece of work”—man ; or, rather, a girl. So instead of looking into “Modern Science and Modern Thought” for a Text, it seems that we may continue, in one more letter, to consider “how like a god !” man is ; and especially woman “in action how like an angel !” in contrast with all other creatures known to us ; and—being creatures—although so “like a god” in this, cosmically, mere speck of a world, yet so infinitely inferior and unlike the Almighty Creator and Controller of the Constellations.

My American friend writes : "I have been much interested in a little girl eleven years old at our Blind Asylum ; who is deaf, dumb, and blind from birth ; and comes from our ruffian State of Texas. I send you by this mail some of her correspondence with Bishop Brooks. Her definition of what a soul and what a musician is give an idea of what the animal mind might be, if further developed ; for who could call her a human being if she had remained in her own home ? "

Now here is a little child—Helen Keller—from wicked Texas ; whom my friend may reasonably consider hardly human in her native condition ; because, worse off than a dog in having no sight ; worse off than a dog in hearing no sounds of the voices of love and friendship ; and worse off than a dog in having no power to express with joyful bark the delights of a ramble with its human friend in the sunny and gamey lanes and fields and woods ; yet little Helen Keller retains her god-like-ness in what humanity remains to her—retains her potentiality to *become*, as Hamlet further expresses it "The beauty of the world, and the paragon of animals ! "

The god-like-ness of humanity stands out here in vivid light ; in both the instructor and the instructed. But all the divinity of the powers of the instructor would have been all unavailing with our friend the dog ; with all his intelligence and sympathy with us ; looking dog-soul into man-soul from and through the eye. What other creature looks into us through the eye like the dog, besides ourselves ?

In the case of little Helen Keller, so imperfect and wanting in her humanity, there remains such *capability* of divine development, that the human instructor finds ample means to penetrate the blindness and the deafness ; to shed bright light and knowledge into the erst dark human mind ; and to teach that speechless being to express itself eloquently to the intelligence of all mankind, without a word of vocal human language. Here is a bursting forth of divinity !

Our intelligent and beloved dog, who speaks to us limitedly with his bright eyes—dog's eye to human eye ; and his joyous "yap ! yap !" or sorrowful whine ; and who distinctly understands the word "rats !" and as distinctly the word "cats ! ;" can never be raised to the god-like-ness of this poor little half-created girl ; who is deficient of all the dog's wonderful unknown senses—known to be, and yet unknown ;

and short of all his sight and hearing and barking besides. But although the dog cannot possibly attain to the education and development of this functionally imperfect little girl from wicked Texas, I quite believe that he is only in a stage of development from something lower to something higher ; and that he has got along pretty well thus far. For he leads a tolerably happy life. Contrast his average existence of comparative freedom and favour as the friend and companion of man, woman, and child ; from puppyhood to old age—contrast this with the lot of the majority of donkeys and horses—poor slaves !—ultimately to be devoured by the more fortunate dogs. Dear Charles Dickens had his eye upon the dogs. I sometimes read his books late at night for mental rest ; and last night was reading “Our Mutual Friend” (Why, that ought to have been a family dog !) and on p. 206, vol. II First Edition, is this passage :

“ It was a Saturday evening, and at such a time the village dogs, always much more interested in the doings of humanity than in the affairs of their own species, were particularly active. At the general shop, at the butcher’s and at the public-house, they evinced an inquiring spirit never to be satisfied. Their especial interest in the public-house would seem to imply some latent rakishness in the canine character ; for little was eaten there, and they, having no taste for beer or tobacco (Mrs. Hubbard’s dog is said to have smoked, but proof is wanting), could only have been attracted by sympathy with loose convivial habits. Moreover, a most wretched fiddle played within ; a fiddle so unutterably vile, that one lean long-bodied cur, with a better ear than the rest, found himself under compulsion at intervals to go round the corner and howl. Yet even he returned to the public-house on each occasion with the tenacity of a confirmed drunkard.”

Can the writer mean to hint that this canine “sympathy with loose convivial habits” and his attraction to the public-house “with the tenacity of a confirmed drunkard” although he does not drink, is “some latent rakishness” surviving a previous existence ? There certainly is a loving kinship, or natural sympathy, between man and dog ; that exists between man and nothing else ; not even man and monkey. Has the dog merely “gone down one” from a previous ill-spent human life of toping jolly-dog-ism, to win his way back by a well-spent dog-life ; and then on and on ? There certainly seems to

be a kinship somehow ; instinctively and lovingly felt on both sides. But while with man there seems to be a potentiality for what seems to be an almost unlimited variety of education—although limited it certainly is—the bounds in the case of the dog during his dog-hood are very distinct.

But let us return to our imperfectly created little girl from wicked Texas, and wonder at the divine potentiality which we shall find even there. She was much less favoured with physical senses than our canine friend ; even of less account, apparently, in the animal creation, than the blind puppy ; who hears and knows its mother's voice ; and can make its own cries reach its mother's ears and heart. To this child all creation was darkness and silence up to the age of six years ; a year beyond the age at which your darling has already developed her human divinity so marvellously ; and is herself a light moving in light—a radiance of joy in all her circle.

How much more desolate was the condition of this poor Texan child, than was that of him who sang :

“ Thee I revisit safe,
And feel thy sovran vital lamp ; but thou
Revisit'st not these eyes, that roll in vain
To find thy piercing ray, and find no dawn ;
. Thus with the year
Seasons return, but not to me returns
Day, or the sweet approach of even or morn,
Or sight of vernal bloom, or summer's rose,
Or flocks, or herds, or human face divine ;
But cloud instead, and ever-during dark
Surrounds me, from the cheerful ways of men
Cut off, and for the book of knowledge fair
Presented with a universal blank
Of nature's works to me expunged and rased,
And wisdom at one entrance quite shut out.”

Poor Helen had wisdom quite shut out at two entrances—ear-gate as well as eye-gate. But at the age of about 6 years she was taken to “The Perkins Institution and Massachusetts School for the Blind,” and then her earliest knowledge of language came to her through the manual alphabet. This was the first fanning of that spark of human

divinity, which has since gradually blazed into divine light, life, and knowledge ; so that, having no physical sight, she now sees a beautiful crowded world ; and, having no physical hearing, she now hears a world of sweet harmony ; and having no physical voice she yet tells us what in her bright sensitive mind she sees and hears. Here is a remarkable instance and proof of her thorough appreciation and retention of what is passed into her mind through the medium of the manual alphabet. She had been told by this means a fairy tale about King Frost, and long after wrote her own version of the same, giving forth again in her own language the thoughts and scenes which had been conveyed into her mind. I have cut the following from a Boston Evening paper, whose title I have lost, of 6 January, 1892 :

“ THE FROST KING.

“ A STORY BY HELEN KELLER, THE DEAF, DUMB AND BLIND GIRL.

“ The Mentor is the title of a pretty and interesting little magazine issued by the alumni of the Perkins Institution for the Blind. It is a unique publication, and does not appeal for support merely on the basis of charity. Its intrinsic merits are enough to warrant its success.

“ The January number contains a story written by Helen Keller, the deaf, dumb and blind girl, who is now 11 years of age. The published accounts of the efforts made to keep from Helen the knowledge of God, for the purpose of demonstrating, if possible, the inborn, intuitive perception of a divine or higher power, will add piquancy and interest to the little story, which we publish in full. Helen has been totally deaf, dumb and blind since infancy, and it is less than five years since her earliest knowledge of language came to her through the manual alphabet. The command of language and the literary style, in view of these facts, is remarkable.

“ THE FROST KING.

“ King Frost lives in a beautiful palace, far to the North, in the land of perpetual snow. The palace, which is magnificent beyond description, was built centuries ago, in the reign of King Glacier. At a little distance from the palace we might easily mistake it for a mountain, whose peaks were mounting heavenward to receive the last kiss of the departing day. But on nearer approach we should discover our error. What we had supposed to be peaks were in

reality a thousand glittering spires. Nothing could be more beautiful than the architecture of this ice palace. The walls are curiously constructed of massive blocks of ice, which terminate in cliff-like towers. The entrance to the palace is at the end of an arched recess, and it is guarded night and day by twelve soldierly looking white bears.

"But, children, you must make King Frost a visit the very first opportunity you have, and see for yourselves this wonderful palace. The old King will welcome you kindly for he loves children and it is his chief delight to give them pleasure.

"You must know that King Frost, like all other Kings, has great treasures of gold and precious stones, but as he is a generous old monarch he endeavours to make a right use of his riches. So wherever he goes he does many wonderful works ; he builds bridges over every stream, as transparent as glass, but often as strong as iron ; he shakes the forest trees until the ripe nuts fall into the laps of laughing children ; he puts the flowers to sleep with one touch of his hand ; then, lest we should mourn for their bright faces, he paints the leaves with gold and crimson and emerald, and when his task is done the trees are beautiful enough to comfort us for the flight of summer. I will tell you how King Frost happened to think of painting the leaves, for it is a strange story.

"One day while King Frost was surveying his vast wealth and thinking what good he could do with it, he suddenly bethought him of his jolly old neighbour, Santa Claus. 'I will send my treasures to Santa Claus,' said the King to himself, 'he is the very man to dispose of them satisfactorily for he knows where the poor and the unhappy live, and his kind old heart is always full of benevolent plans for their relief.' So he called together the merry little fairies of his household and, showing them the jars and vases containing his treasures, he bade them carry them to the palace of Santa Claus as quickly as they could. The fairies promised obedience and were off in a twinkling, dragging the heavy jars and vases along after them as well as they could, now and then grumbling a little at having such a hard task, for they were idle fairies and loved to play better than to work. After awhile they came to a great forest, and, being tired and hungry, they thought they would rest a little and look for nuts before continuing their journey. But thinking their treasure might be stolen from them they hid the jars among the thick green leaves of the various trees

until they were sure that no one could find them. Then they began to wander merrily about searching for nuts, climbing trees, peeping curiously into the empty birds' nests and playing hide-and-seek from behind the trees. Now, these naughty fairies were so busy and so merry over their frolic that they forgot all about their errand and their master's command to go quickly, but soon they found to their dismay why they had been bidden to hasten, for although they had, as they supposed, hidden the treasures carefully, yet the bright eyes of King Sun had spied out the jars among the trees, and as he and King Frost could never agree as to what was the best way of benefitting the world, he was very glad of the opportunity of playing a joke upon his rather sharp rival. King Sun laughed softly to himself when the delicate jars began to melt and break. At length every jar and vase was cracked or broken and the precious stones they contained were melting too and running in little streams over the trees and bushes of the forest.

"Still the idle fairies did not notice what was happening for they were down on the grass and the wonderful shower of treasure was a long time in reaching them ; but at last they plainly heard the tinkling of many drops falling like rain through the forest and sliding from leaf to leaf until they reached the little bushes by their side, when to their astonishment they discovered that the rain drops were melted rubies which hardened on the leaves and turned them to crimson and gold in a moment. Then looking around more closely they saw that much of the treasure was already melted, for the oaks and maples were arrayed in gorgeous dresses of gold and crimson and emerald. It was very beautiful, but the disobedient fairies were too frightened to notice the beauty of the trees. They were afraid that King Frost would come and punish them. So they hid themselves among the bushes and waited silently for something to happen. Their fears were well founded, for their long absence had alarmed the King and he mounted North Wind and went out in search of his tardy couriers. Of course he had not gone far when he noticed the brightness of the leaves, and he quickly guessed the cause when he saw the broken jars from which the treasure was still dropping.

"At first King Frost was very angry and the fairies trembled and crouched down in their hiding places, and I do not know what might have happened to them if just then a party of boys and girls had not

entered the wood. When the children saw the trees all aglow with brilliant colors they clapped their hands and shouted for joy and immediately began to pick great bunches to take home. ‘The leaves are as lovely as the flowers !’ cried they, in their delight. Their pleasure banished the anger from King Frost’s heart and the frown from his brow, and he, too, began to admire the painted trees. He said to himself, ‘My treasures are not wasted if they make little children happy. My idle fairies and my fiery enemy have taught me a new way of doing good.’ When the fairies heard this they were greatly relieved and came forth from their hiding-places, confessed their fault and asked their master’s forgiveness. Ever since that time it has been King Frost’s great delight to paint the leaves with the glowing colors we see in the autumn, and, if they are not covered with gold and precious stones I cannot imagine what makes them so bright, can you ?’

In apprehension how like a god ! We realize it more than ever, I think, when we contemplate this deaf, dumb, blind piece of humanity, capable of such “apprehension” and radiant illumination as this. Well might Hamlet exclaim “What a piece of work is a man !” since we find such “a piece of work” even in this only half-created little girl, when her divinity is developed by a subtle scheme of education, which is, itself, a divine contrivance ; almost justifying Hamlet’s exclamation “ How infinite in faculty !”

Helen’s teacher at the School for the Blind is Miss Sullivan ; who reports the progress of development at considerable length, from which I quote the following :

“ ‘Where did I come from, and where shall I go when I die?’ were questions asked by my pupil nearly three years ago. But the explanations which she was able to understand at that time did not satisfy, although they forced her to remain silent, until her mind should begin to put forth its higher powers, and generalize from innumerable impressions and ideas which streamed in upon it from books and from her daily experiences. Without any particular direction being given to her mind, it naturally sought for the cause of things.

“ As her observation of phenomena became more extensive and her vocabulary richer and more subtle, enabling her to express her own conceptions and ideas clearly, and also to comprehend the

thoughts and experiences of others, she became acquainted with the limit of human creative power, and perceived that some power, not human, must have created the earth, the sun, and the thousand natural objects with which she was perfectly familiar.

"Finally, she one day demanded a name for the power, the existence of which she had already conceived in her own mind. The study of the natural sciences and geography had done much to arouse her curiosity with regard to the origin of things. She began to realize, in a dim and child-like way, the vastness and manifold variety of the works of nature." Further on in this most interesting report Miss Sullivan introduces quotations from correspondence between this little half-created girl of eleven, and the American Bishop Brooks, some of which I must give you ; and I think you will like the Bishop's words, especially about *The Medicine* ; which will do us both good :

"No creed or dogma has been taught to Helen," says Miss Sullivan, "nor has any effort been made to force religious beliefs upon her attention. Being fully aware of my own incompetence to give her any adequate explanations of the mysteries which underlie the names of God, soul, and immortality, I have always felt obliged by a sense of duty to my pupil, to say as little as possible about spiritual matters. The Rt. Rev. Phillips Brooks has explained to her in a beautiful way the fatherhood of God. The following extracts from the letters which passed between them will give an adequate idea of the religious instruction which she had received from him.

"In a letter to Bishop Brooks, Helen says : 'Why does the great Father in heaven think it is best for us to have very great sorrow and pain sometimes ? I am always happy, and so was little Lord Fauntleroy ; but dear little Jakey's life was full of sadness, and God did not put the light in his eyes, and he was blind, and his father was not gentle and loving. Do you think Jakey loved his Father in heaven more because his other father was unkind to him ? How did God tell people that His home was in heaven ? When people do very wrong and hurt animals and treat children unkindly, God is grieved ; but what will he do to them to teach them to be pitiful and loving ? Please tell me something that you know about God. I like so much to hear about my loving Father who is so good and wise.'"

That portion of the good Bishop's reply to this juvenile epistle which I wish you to see is this :

"But God does not only want us to be *happy*. He wants us to be *good*. He wants that most of all. He knows that we can be really happy only when we are good. A great deal of the trouble that is in the world is medicine which is very bad to take, but which is good to take because it makes us better. We see how good people may be in great trouble when we think of Jesus, who was the greatest sufferer that ever lived, and yet was the best being, and so, I am sure, the happiest being that the world has ever seen."

My American friend's reference to Helen's ideas about the soul and about musicians relates to the following passages of Miss Sullivan's report :

"One day she said, sadly, 'I am blind and deaf. That is why I cannot see God.' I taught her the word *invisible*, and told her we could not see God with our eyes, because he was a spirit : but that when our hearts were full of goodness and gentleness, then we saw him because then we were more like him.

"At another time she asked, 'What is a soul?' 'No one knows what the soul is like;' I replied, 'but we know that it is not the body, and it is that part of us which thinks and loves and hopes, and which Christian people believe will live on after the body is dead.' I then asked her, 'Can you think of your soul as separate from your body?' 'Oh, yes!' she replied, 'because last hour I was thinking very hard of Mr. Anagnos, and then my mind—my soul, was in Athens, but my body was here in the parlor.' At this point another thought seemed to flash through her mind, and she added, 'But Mr. Anagnos did not speak to my soul.' I explained to her that the soul, too, is invisible ; or, in other words, that it is without apparent form. 'But if I write what my soul thinks,' she said, 'then it will be visible, and the words will be its body.'

"The literal sense in which she sometimes takes common words and idioms shows how necessary it is that we should make sure that she receives their correct meaning. When told recently that Hungarians were born musicians, she asked in surprise, 'Do they sing when they are born?' When her friend added that some of the pupils he had seen in Buda-Pesth had more than one hundred tunes in their heads, she said, laughing, 'I think their heads must be very noisy.' She sees the ridiculous quickly, and instead of being seriously troubled by metaphorical language, as some deaf-mutes are, she is

often amused at her own too literal conception of its meaning.

"One day A. thought she would improve Helen's mind by teaching her the Twenty-third Psalm. After it had been read to her once or twice, her quick memory retained the strange, and (to her) meaningless words, and she was able to repeat the Psalm from beginning to end without a mistake. When I came for her she was full of questions, the first being this : 'What is a Psalm?' After this was explained to her she said, with an air of the greatest amusement, 'It said, *the Lord is my shepherd!* but how can that be? For I am not a sheep!' I told her that David was a poet, and liked to imagine that the world was God's great pasture, and that the people were his sheep, and he their loving and careful shepherd. Her comment on this explanation was, 'I do not like to think that I am a sheep at all, and I do not think it would be nice to lie down in the fields, do you?'

"She always resented any comparison of herself with inferior animals. If called a busy bee, she will reply, 'No, I am a busy little girl. I can do much more than a busy bee.'

"Having been told that the soul was without form, she was much perplexed at David's words, 'He leadeth my soul.' 'Has it feet? Can it walk? Is it blind?' she asked ; for in her mind the idea of being led was associated with blindness."

I did not pause, but perhaps you did, at the passage where Miss Sullivan says : "I taught her the word *invisible*." What a divine teacher and scholar—both!—as I have hinted before. Fancy a child born totally blind and totally deaf, being taught to understand the word "invisible," as well as all the rest ; all by means of delicate manual signs that are only felt and not seen. One would have thought such a gateless citadel utterly inaccessible. The intelligible language of the voice is wonderful ; this communication by the pen is wonderful ; but how much more marvellous is Miss Sullivan's teaching and dear little Helen's reception of, a full vocabulary, by mere touch of hand? I have said "dear" Helen. We shall both love her presently. And this language of touch actually carries with it positive *light* into the mind of the deaf blind ; until that mind becomes filled with light and colour and even music. Miss Alice King, the sweet blind authoress, said, as I have recorded on page 387 of the Jewitt volume, that she seemed to live perpetually in "a radiant cloud of light." Possibly you may know Miss Alice King for I re-

member your cousin telling me some years ago that he knew her father, who was rector of Cutcombe. But the radiant cloud of light in which Miss Alice King lives is not so wonderful as the light which irradiates the mind of little Helen with her speechlessness and deafness added to her blindness.

Charles Dickens when at Lausanne in 1846 took much interest in the Blind Institution there ; and especially in one of its inmates, a youth aged 18 years who was born deaf and dumb and lost his sight by an accident when about five years old. Dickens described him as “an excellent carpenter ; a first-rate turner ; and runs about the building with a certainty and confidence which none of the merely blind pupils acquire. He has a great many ideas, and an instinctive dread of death. He knows of God, as of thought enthroned somewhere ; and once told, on nature’s prompting (the devil’s of course) a lie. He was sitting at dinner, and the Director asked him whether he had had anything to drink ; to which he instantly replied ‘No,’ in order that he might get some more, though he had been served in his turn. It was explained to him that this was a wrong thing, and would’nt do, and that he was to be locked up in a room for it ; which was done. Soon after this he had a dream of being bitten in the shoulder by some strange animal. As it left a great impression on his mind, he told M. the Director that he had told another lie in the night. In proof of it he related his dream, and added, ‘It must be a lie you know, because there is no strange animal here, and I never was bitten.’ Being informed that this sort of lie was a harmless one, and was called a dream, he asked whether dead people ever dreamed while they were lying in the ground :

“ ‘Ay, there’s the rub ;
For in that sleep of death what dreams may come,
When we have shuffled off this mortal coil.’

“He is one of the most curious and interesting studies possible.”

But let us return to our still more interesting little Helen. Miss Sullivan writes :

“Surrounded by loving friends and the gentlest influences, as Helen had always been, she has, from the earliest stage of her intellectual enlightenment, willingly done right. She knows with unerring instinct what is right, and does it joyously. She does not think of

one wrong act as harmless, of another as of no consequence, and of another as not intended. To her pure soul all evil is equally unlovely.

"While to do right is as natural to her as breathing, it is most pleasing to observe that beautiful spirit of love which prompts her to extenuate the faults of those she believes to have done wrong. When told that any of the children have been naughty, she will immediately make some apology for them, and say--'It was a mistake. He did not mean to do wrong.'

"She heard recently that her beautiful mastiff had been killed by the police near her home ; but the thought of blaming the men who had done the cruel deed did not apparently enter her head. As soon as her first burst of sorrow had subsided, she said--'I am sure they could not have known what a good dog Lioness was !'"

Would not this darling little Christian be shocked at the idea of the God of Love, or the God that *is* Love, being the author, the ever unrelenting author, of *Eternal Punishments*! Her teacher continues :

"Thus the knowledge of evil calls into existence those noble sentiments—loving sympathy for the suffering, loving pity for wrong-doers, and the desire to help and comfort others."

Here is a dream recorded by this sweet child : "Last night I dreamt that long, long ago, when the birds and flowers and trees were first made, the great God who had created all things sat upon a beautiful cloud which looked like silver, and seemed to float in the midst of the blue sky like a throne ; and he looked down upon the earth—the wonderful world he had made out of his own thought. Oh, how beautiful the earth was ! with her great mountains climbing towards the sky, and her valleys filled with sweet-smelling flowers and delicious fruit. The trees seemed alive with beautiful living things ; the little birds' joyous songs made the air vibrate with music. I felt it in my dream. I knelt on the cool green moss that crept down to the edge of the merry little brooks, and I touched the water as it rippled past me. The broad deep lakes were as quiet as little sleeping babies, and I felt the ground tremble under my feet when the river went rushing past to join the stormy ocean. Then I went to the shore and put my bare feet in the water, and felt the waves beating against the shore continually. And God smiled and the world was filled with light, and there was no evil, no wrong in all the world, only love, and beauty, and goodness. Just then I felt teacher

kissing my lips and I awoke." Do you not love her? And, now, fare thee well, dear Helen! I, too, in thought and will, kiss thee on the lips; divine little sister; and sweet dreamer of divine dreams! May you be ever happy as now sweet Helen; living and dreaming in the constant glory of celestial light; whether waking or sleeping—although ever shrouded in utter terrestrial darkness: shewing us that there is truly a light besides that of the perishable suns; which will shine as brightly in all-inhabited Space—the ultimate Heaven—when the suns shall shine no more!

And our text is: "What a piece of work is a man! how noble in reason! how infinite in faculty! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god!"

LETTER XXVII.

MORE ON THE NEBULAR THEORY.—THE MANY MANSIONS OF THE FATHER'S HOUSE.—APOLOGY FOR SUNWORSHIP.—THE FIERY PALACE OF ASMODEUS.—BREATHING AND DRINKING FIRE.—THE COMBUSTION OF POTASSIUM AND ITS EVIDENCE.—THE METEORS AND THEIR EVIDENCE.—RECAPITULATION OF EVIDENCE AGAINST THE NEBULAR THEORY.

18 MARCH, 1892.



THANK you for the sight of Mr. Farquhar's commentary on these letters of review and of many rambling thoughts. It surprises me that your busy friends should find time and patience to wade through five or six hundred pages of my manuscript. But well I know that it is only done in chivalric obedience to your wish; and that the honour done to my work is really done to you. Somebody else's friends thus set to work would take it out of the reviewer by reviewing his review severely. But your friends are so very kind in the matter, and Mr. Farquhar not the least so. The comments of a scholar of such profound thought and intelligence are of especial interest and value. He lives in a special "radiant cloud of light"—to use Miss Alice King's expression—all his own; as we know from his writings; the

brightness of that light being especially radiant from the pages of his profound books—"The Gospel of Divine Humanity," "Hamartia : An Inquiry into the Nature and Origin of Evil," and "The Christian Revelation of God the Basis of True Philosophy." And he realizes this light most when he shuts his eyes. No wonder that he loves to think of suns and worlds as being created out of a "radiant cloud of light," and clings to the nebular theory. I think from this that my arguments against that theory must have been too feebly expressed ; because the nebular origin appears to me quite impossible in action. At the same time I shall fully respect views maintained in opposition to my own on this subject ; especially if held by such a thinker and seer as your friend ; after I have done my best and said my utmost. For I know very well that reasoning is very often honestly made to shew the wrong to be the right. Especially should we be humble and modest when discussing a subject so far away as the little fluffy Dumb-Bell nebula, which I have already alluded to. So far away that it appears in the constellation Vulpecula like the slight touch of two delicate finger-tips which had been dipped in gold-dust—or the finger-tips of Psyche after she had been fondling her butterfly. Yet, although so small to telescopic revelation, it is so immense, really, as to exceed many times the utmost diameter of the play-ground of all the planets of our solar system. I will therefore ask your permission to, presently, concentrate and reiterate my arguments against the nebular theory ; that I may try to increase their clearness and force ; and also add to their number.

I quite agree with your friend that the atmosphere and corona of the sun, and of all the suns, may very possibly be Heavenly Paradises ; the happy abodes of blessed spirits. In "Hebrew Captives," page 74, I have hinted that the suns are among the "many mansions" of "My Father's House." You may not remember the passage ; it is this :

"Surely the most pardonable of all human-invented faiths was that which the patriarch Abraham first professed in Ur of the Chaldees. It is not surprising that men, in the absence of better knowledge, should look towards the glorious sun as Heaven and the seat of the Majesty of the Great God ; it being the most glorious object within the ken of man. It is the revealer of nature. And all that is beautiful reality, would, without its light, be blank desolation. Through its influence the earth is fruitful and streams flow. Its

warmth makes all nature pregnant. Its shine inspires the songs of the woods and the groves. It revives and rejoices the heart of man. In a word the whole earth lives by the influence of the Sun's broad smile, as by the beneficent favour of an all-embracing God. It is not therefore unreasonable that primitive man should have regarded the Sun as the special habitation of God when it is the evident and most glorious source of Divine Beneficence. But who shall count the suns of God's universe, where Solar Systems abound in even countless clusters? When knowledge was more limited, the human mind ascribed to Heaven a locality, however indefinite. But we find that incomprehensible space is crowded with God's 'many mansions,' and the locality of His throne and Presence is absorbed into infinity. Astral systems are the mere provinces, solar clusters the counties, and worlds the villages of His Empire. But where is Heaven? where is the Royal Capital of this tremendous dominion? Which of the spheres is the palace of the Divine Majesty where the prayers of His creatures reach His ear? God Himself is Heaven in His omnipresent occupation of the Whole. The Vast Whole is His Palace, filled with His omnipresence. As he fills the whole with His equal ever-presence, so the whole may be said to be His House; and thus 'In My Father's House are many mansions.' And we may regard the suns as the particular mansions whence His physical laws govern the surrounding spheres."

Then, on the next page, as a mere poetic expression in a romance, I use these words: "The sun being the camp of our celestial soldiery, the angel Raphael winged thence his swift journey to the earth to control the jealous rage of the genie Asmodeus." In the same book, on p. 177 this same genie Asmodeus is represented at home in his palace of fire, beneath the foundations of Mount Ararat: "The gloomy way to his palace winded downwards until the genie passed beneath the granite foundations of the earth's crust. Then the vast passage, immensely lofty, was illumined by a brilliant rivulet of burning lava, which whirled and foamed among blocks of adamant, and made a noise as of cool rushing waters. Sometimes the sounds increased to a terrific din when the torrent plunged in cascades of fire into awful depths, to be overtaken again, presently, quietly meandering with the soft murmur of terrestrial water-brooks. For the uneven path through the long cavern followed the course of this

brilliant river of liquid fire. It was one of the vast Plutonic passages through which the terrific internal forces of the earth rush from the birth-places of earthquakes to upheave or submerge the upper continents and islands. The course and direction of such passages are sometimes marked on the earth's surface across whole countries, by long ranges of mountains upheaved in the original formation of these Plutonic tunnels. . . . Grand as was this passage to the palace of Asmodeus, it was but a worthy approach to the vast cavity beneath the foundations of Mount Ararat. It is impossible to awaken in the mind a just conception of the immense dome, once a great arsenal of active volcanic forces. Cataracts of fire rushed down from terraces above, at intervals, around its distant limits, sufficient to light up brilliantly even that immense void, revealing countless stalactites of gold and melted felspar or jade, which had trickled through the granite roof ; some even reaching like enormous pillars to the floor, which was all of beaten gold. Also huge basaltic columns gave lurid reflections, and irregular arches of vast expanse were gilded, and revealed, by the light from the burning torrents ; while in some parts of the rugged walls shone prismatic splendours pleasingly changeful at every turn."

Thus the idea of fire as the habitat of spirits is familiar to my own mind.

It is a curious thought, but true, that even the corporeal inhabitants of this earth live actually in the midst of fire ; and ever breathe fire ; and drink it also. It is what we call *latent* ; but is really fire ; and is a large constituent of the air and of water. To sight adapted to see it we should be seen to live enveloped in a bright atmosphere of fire during the darkest night, and to be ever inhaling flames. And without it we could not live. The flame of a candle or lamp ; the fire in the grate ; the burning of a volcano ; the blaze of a burning forest ; or of a city of Moscow or of London ; and the flashes of summer lightning ; are all, and only small, manifestations of the all encompassing fire of the air in which we live and move and have our being—the fire which we ever breathe. It is not in the candle ; or oil or spirit of the lamp ; nor in the coal in the grate ; nor in the materials of the volcano ; nor in the timber of the forest ; nor of the city of Moscow or of London ; but it is all mere manifestation of a small portion of the fire of the air which we constantly breathe.

Exclude the air from all these burning things and they will cease to burn. And in water also, as I have said, we constantly drink this fire. This fire may be made manifest by plunging a piece of potassium into water. Being lighter than water, although a shining white metal, it swims on the surface, and burns with a brilliant flame in condensing the oxygen of the water into itself in solid form ; and if held down under the surface of the water it becomes and remains red-hot in the condensation of the oxygen ; the heat made thus visible being previously latent in the water. And there was even more heat latent there, in the water, than is thus made visible—that portion of it which changes the liquid hydrogen, which the potassium rejects, into gaseous hydrogen ; which contains more latent heat than the liquid ; but in remaining latent is invisible. In this operation there was no fire in the potassium, which is a piece of bright metal, the base of potash : or, at any rate, the bright visible heat of which we are speaking was not in the potassium, but in the liquid oxygen of the water—its latent heat of liquidity—hidden from our sight and sense of touch in that state, but always there, and visible as fire to any sight adapted thereto. Thus for a certainty the flames of fire are adapted to our corporeal use as flames of LIFE ; enveloped in which we live ; and which we inhale and exhale and drink. The same Almighty can as easily adapt creatures to this same heat, in its, to us, visible and sensible condition, and so populate, if He will it, all the countless suns of His empire. Now, if you please, we will return to the nebular theory.

A few days since a scientific friend happened, in conversation, to make allusion to that theory, and I observed to him that I had studied it closely and found it wanting. He then asked : “ Then how were the worlds made ? ” I replied : “ I do not know.” I then pointed out to him that there were plenty of waste pieces of other-world stuff still lying about and flying about in Space ; of which we get a good share attracted into our atmosphere ; and then only do they become nebulous, very momentarily indeed. It is curious that these meteoric fragments of world-material that are large enough to penetrate our atmosphere and reach the surface of the earth, are so often pure metallic iron and nickel, the iron preponderating to the extent of about ninety per cent. The only metallic iron which we find on our globe, that is not from the hand of man, is this meteoric

metal cannonaded from the heavens ; all our original stock having long ago been oxidized and, mostly, variously mixed up with other materials. The preponderance of iron in the meteors, or world-stuff with which Space is littered, is in accordance with the preponderance of its oxides in our own globe, and suggests that it may be the same with the other planets. With us it has become so mixed up with the other materials as to impart to the earth its prevailing tints of redness, brownness, buffness, and blueness. There is nothing whatever in the condition and arrangement of the materials of our globe to suggest condensation from a state of nebulosity ; but, instead, all conditions and arrangements deny such a deposition ; and so do our visitors the meteors, speaking for other world-stuff.

It seems to me that this meteoric iron, in its solid simplicity, apart from its nickel, must be regarded as one of the first conditions of matter—the original condition of matter, because if rendered fluid or gaseous it is no longer a simple uncompounded thing, but is a compound of iron with that mystery Heat. Yet I hardly know why we should deem the one a mystery any more than the other ; only the one seems to represent life, and the other death. And as to this heat we must bear in mind that the heat of the nebulæ which we have under consideration is that sensible condition of heat which is manifested to our sight by ordinary light ; for it is only by that ordinary sensible light that we know of the existence of the nebulæ in distant Space ; not the latent heat of the air and water ; nor in its condition of electricity ; nor what we term spiritual heat ; nor that light which illumines the mind of the physically blind. Its light is the same as the manifested light of the sun, and its heat is supposed to be of the same sensible nature as that of the sun, holding all the materials of worlds in the condition of ignited vapour or steam or gas.

I have already shewn that as the various materials of which worlds are made, melt and vaporize at different degrees of heat, they must in like manner condense from vaporosity at correspondingly different degrees of heat. Supposing it were at all possible for a mass of hot gaseousness, or luminous metal-steam more correctly, to cool gradually and slowly in open cold space, that which required the greatest heat to keep it in vapour would be the first to solidify. Platinum for instance would be the first to condense, and that would

form the very core of the world-ball ; which it does not, for we find some of it on the surface. Then would follow manganese, shutting in the platinum ; then iron, closing over both ; then nickel, cobalt, gold, silver, copper, zinc, lead, tin, sulphur, etc. ; all these encompassing the iron and its predecessors ; and placing them out of man's reach for ever. I am illustrating with only a few familiar samples of world-material the globular layer upon layer sort of structure which would result from the succession of depositions from gradually cooling vapour, or steam, of earth-matter. And these few examples are sufficient to shew that our useful iron would be placed for ever beyond our reach in such a scheme of world-making. The process would be very pretty to watch, and would produce very neat results ; especially if these globes when finished were cut through the middle like so many Spanish onions to exhibit the pretty sections of layer upon layer. But for useful worlds ; or solar systems of worlds, with wide play-grounds ; and central living suns to govern and bless them ; the process is a failure and an impossibility ; and, thank Heaven ! *our* world at any rate has been more wisely made. It is curious to hear philosophers talk of worlds or satellites "throwing themselves off" from one another in this condensation from burning gas.

And I am asked "How was this world made then ?" and I reply : "I do not know."

Our earth proves that no original lamellar deposition took place therein in the natural manner which I have sketched ; but we have granite instead ; and the meteoric bodies bear witness on behalf of the outside litter of world-stuff in space that no such uniformity of deposition took place in *their* construction. One meteoric mass contains iron, nickel, cobalt, manganese, copper, magnesium, carbon, phosphorus, sulphur, and silicon. Here is a general mixture of elements quite opposed to any possible heat-assortment. And a group of these meteors yields all the above and the following also : lithium, sodium, potassium, calcium, aluminium, titanium, chromium, tin, antimony, arsenic, vanadium, hydrogen, oxygen, and chlorine.

But no wonder we find no traces of the natural consequences of the theoretic deposition of worlds from burning vapour—the slow cooling of ignited gas in open cold space ; because such a condition and course is utterly contrary to natural laws, and impossible. How could a mere isolated flame of burning gas—isolated in cold space—

continue a flame of burning gas for hundreds of years, to say nothing of thousands? If such a heat as would be necessary to vaporize iron and platinum, could by some miracle be kindled in the heavens, as soon as the climax had been reached the cooling would not be slow; but very rapid with the heat all shooting off in every direction into space like flashes of lightning. No matter how big the fiery cloud, the outer contact of the absorbing cold of space would be proportionately as effective on all its outer surface as if it were a smaller patch of fire. If the nebula were surrounded with fierce suns, capable of keeping up the supply of heat until they themselves gradually cooled, it would be another matter. But what would be the use of it all after all? Why make solids into fiery vapour that they may cool down again into solids? And these nebulae are supposed to be self-supporting, after they have reached the climax of ignition; and are left without any sources of ignition.

Psyche's finger-tip touches of gold-dust—the Dumb-Bell—and all the rest of these supposed fiery patches of incipient solar systems, remain in their places in the several constellations, unchanged in brilliancy or shape, whenever one chooses to look for them. They are so far away that the light of them must positively have taken hundreds of years to reach us. And still they remain the same. This would be "slow cooling" indeed for mere flame of burning gas; burning unsupported; with no pipe of fresh supply of anything laid on—as if you could take the flame from a gas-jet or a candlewick, and isolate it in the air; and it should continue to burn there for hundreds or thousands of years!

I have been shewing that our atmosphere is itself as a nebula of latent fire; and that our waters are as brooks, rivers, lakes, and seas of fire. But they are not self-sustained in this fiery condition. The fire is every instant passing away from them into space; and the fresh supply, just equal, is as constantly maintained by the sun. If this supply were not kept up the whole would collapse into solidity with very great rapidity—in a few hours. Our nocturnal atmosphere does not collapse each night because our globe is like something roasting and constantly turning before a fire; and no time is left for any part to cool—the warm day succeeding the night, and the compensating summer succeeding the winter in regular succession. And as to our atmosphere we can capture a sample of air in an air-tight bag when-

ever we wish, and keep it captive there, and analyze it at our leisure ; but how shall we capture a bag of *burning* gas and carry it off, no matter how fire-proof and non-conductive the bag ? The heat would escape quickly, through the veriest non-conductor known to us, into the air. And how much sooner, as I have already said, must the heat of such burning gas escape into the so much colder and much more conductive stellar space ? Surely I have said enough—weary-some stuff—on this subject.

But, then ; How *were* the worlds made ?

I don't know.

But I have before observed that my substitute for the nebular theory is simply to leave out the nebular theory. Leave the solids alone with the heat which we know of, and are used to ; and let them, by means of the liquids and gases produced by this familiar heat, operate upon one another by their natural chemical affinities and aversions ; as we find they have done and are still doing.

Mr. Farquhar refers to the recent change of opinion respecting the so-called Eozoon Canadense. I still regard it as correctly so named. It is just the sort of fossil trace of life to be looked for in the Laurentian limestones of earliest deposition. The microscope may and may not be useful in such an examination. If it reveals the special natural texture or structure of a fossil it gives proof positive. But if it does not reveal that texture or structure it does not give proof negative. It often happens that an original fossil becomes entirely dissolved away from its porous but non-soluble matrix, through the gradual and constant seekage of water through the mass ; and a perfectly hollow chamber is left in the rock where the fossil once was, whether large or microscopically small. After that the porosity of the underpart of the matrix may be stopped by some crystallizing solution filling up the pores, and the same crystallizing fluid will gradually fill up the matrix and leave a false fossil without a trace of the original texture of structure ; but there is still the external form. But, as Mr. Farquhar says, the question of Eozoon or not, does not affect my argument on Mr. Laing's remarks about it and the igneous rocks.

LETTER XXVIII.

THE MYSTERY OF LIFE.—THE THEORY OF SPONTANEOUS GENERATION.—PROTOPLASMIC CELLS.—“I SPECT I GROW'D.”—UNIVERSAL LAW AND ENERGY.—DESIGN IN THE CREATION DENIED.—SELF-CREATIVE AND SELF-ADAPTIVE FISH BONES.—THE FOOT OF AJAX.

31 MARCH, 1892.



HAVE been reading Mr. Laing's eloquent chapter on “Life.” This mystery, as is only consistent, is viewed in the same clocky light as the mysterious “law, which has been shown to prevail universally throughout space, time, and inorganic matter.”

This is on page 78: “The living plant or animal grows from within by taking supplies of fresh matter into its inner laboratory, where it is worked up into a variety of complex products needed for the existence and reproduction of life.”

But who shall fathom the mystery of this *power to grow* from within, by *taking supplies*? It is a power working independently of the consciousness of the animal, which is all unconscious of the mode of operation; and independently of the mind, which is engaged on other subjects all the time; and has no more to do with the operation than it has to do with nature's secret, deft, and sure mode of mending a broken limb. We can no more fathom the mystery by thinking of it than we can accelerate that growth and add one cubit to our height by taking thought. To describe the fact that an animal grows by taking supplies throws no light on the mystery of life and its laws; nor can in any way aid to eliminate the Law-maker and Law-sustainer. What must this Clock of the Universe become if the so-called Agnostics could succeed, as they try, in withdrawing from it the Spirit of God? A clock—still a clock; but STOPPED! with no Clockmaker to look to it! And so, when we have found out the physical structure of man, and reached down to protoplasms and cells, and say that in the latter we have discovered, very nearly, the beginning of life, we yet know no more of the mystery of life than before we started on the enquiry. The human structure may be perfect in its make and mechanism with its protoplasms and cells;

yet the life may suddenly depart therefrom ; and the mystery of growth and “taking supplies” cease its operation ; although the protoplasms and cells and all other complex matter are there in the still warm dead.

Speaking of these protoplasms on page 79 Mr. Laing says : “They are, therefore, the first step from the inorganic into the organic world, and if spontaneous generation takes place anywhere, it is in the passage of the chemical elements from the simple and stable combinations of the former into the complex and plastic combinations of the latter.” It is my opinion that the Creator never works by means of so-called spontaneous generation—a sort of accidental meeting of elements producing life. The elements may all be there, and warm, as I have just said, without the life. I have shewn before that the fly-germs—real life-protoplasms—ever floating in the atmosphere and in the waters, ready to burst into live organisms when they are wanted, in different forms, according to the medium in which they are immersed and the sort of food they will find there—these life-germs so universal in the air and water, are projected from the bodies of flies which are almost equally universal on the surface of the earth. The destiny and *joy* of the life of the fly, from the egg to the end, is scavenging ; and the destiny of its death appears to be the production of these microscopic scavengers in millions. There seems to be no place nor reason nor need for spontaneous generation.

On page 84 read : “It is as certain that all individual life, from the most elementary protoplasm up to the highest organism Man, originates in a minute or embryo cell, as it is that oxygen and hydrogen combined in certain proportions make water. But if we try to go back one step further, behind the cell, we are stopped. In the inorganic world we can reason our way beyond the microscopic matter to the molecule, and from the molecule to the atom, and are only arrested when we come to the ultimate form of matter, and of energy, out of which the universe is built up. But in the case of life, we are stopped two steps short of this, and cannot tell how the cell containing the germ of life is built up out of the simpler elements.” In another place he says : “Each cell seems to have an independent life of its own, and a faculty of reproduction by splitting into fresh cells similar to itself, which multiply in geometrical progression, assimilating the elements of their substance from the inorganic world

so rapidly as to provide the requisite raw material for higher structures.”

So this is how it is all done. There seems to be no great mystery about it after all; for these protoplasmic cells do it all. *They* are the great secrets of life and animal structure! They put their foolish little heads together—although they have no heads even—and each with its “independent life of its own” unites with its fellows in the decision to multiply; and each by its self-will and self-power turns itself into two; and so on progressively; and each one, assimilating dead matter, brings it to life “so rapidly as to provide the requisite raw material for higher structures.” And so on, to man. That is how it is done we are told. And these processes are called Law. Surely, as I have said before, Law is only another name for God; and we shall come all right in the end. Because if Law can make a Man in this simple way, it is very much like the power and work which we attribute to the Almighty ever active Power and Work of God; and is as much a miracle as any miracle we ever heard of. What avails us our knowledge of protoplasms and cells; and molecules and atoms?—yet of the latter indeed we know nothing. That does not explain the mysterious power and working of the Creator—call Him or It by what name anyone may please—who makes use of these elements so marvellously. It is curious philosophy to hint that they do it all themselves of their own curious knowledge and unity of action and purpose. And certainly the *created being* does not do it. If Man be made by Law, all very well. Then he will naturally feel very much obliged to the Law for making him; and providing for him so wondrously and generously. And he will not only be thankful, but will pray to the Law to continue its wonderful powers of blessing on his behalf. And what will he be doing then? Only changing a name which is already very manifold! And this “Energy” of the Universe of which the so-called Agnostics speak as if they perfectly well understood what they are talking about, is only the Almighty Power of God unattributed to Him.

“I spect I grow'd,” is indeed the conclusion of these unthankful scientific or unscientific thinkers. That was the natural philosophy of dark little Topsy; and is the unnatural philosophy of these equally dark great philosophers—“grow'd,” without Design or Grower. That is all. And thus extremes meet. God is indeed Patient.

Nothing in this book, thus far, has so much surprised me as the

hints that there is no Design in the Creation. The author says on pages 94-5: "Until quite recently all adaptations of means to ends were considered as evidences of design. A series of treatises was published some thirty years ago, for prizes left by the late Duke of Bridgewater, to illustrate this theme, among which one by Sir Charles Bell on the Hand attracted a good deal of attention. It was shown what an admirable machine the human hand is for the various purposes for which it is used, and the inference was drawn that it must have been created so by a designer who adapted means to ends in much the same way as is done by a human inventor. But more complete knowledge has dispelled this idea, and shown that the design, if there be any, must be placed very much farther back, and is in fact involved in the primitive germ from which all vertebrate life certainly, and probably all life, animal and vegetable, have been slowly developed. The human hand is in effect the last stage of a development of the vertebrate type, or type of life in which a series of jointed vertebræ form a backbone, which protects a spinal cord containing the nervous centres, gives points of attachment for the muscles, and forms an axis of support for the looser tissues. Certain of these vertebræ throw out bony spines or rays; at first, by a sort of simple process of vegetable growth, which formed the fins of fishes; then some of these rays dropped off and others coalesced into more complex forms, which made the rudimentary limbs of reptiles; and finally, the continued process of development fashioned them into the more perfect limbs of birds and mammals. In this last stage a vast variety of combinations was developed. Sometimes the bones of the extremities spread out, so as to form long fingers supporting the feathered wings of birds and the membranous wings of bats; sometimes they coalesced into the solid limbs supporting the bodies of large animals, as in the case of the horse; and finally, at the end of the series, they formed that marvellous instrument, the hand, as it appears in the allied genera of monkeys, apes, and man."

Thus "that marvellous instrument, the hand," is made to be a mere development of fish bones. And development itself here seems to mean that *the fish-bones did it all themselves*. The vertebræ "throw out" the bony spines "by a sort of simple process of vegetable growth, which formed the fins of fishes." Then is vegetable growth so very simple a process? To my own poor mind the process is an un-

fathomable mystery—a development of the infinite Power of the Infinite Creator. Mr Laing is not responsible for the invention of the foregoing process of the self-creation of the hand; but he adopts it; and seems to think that he mentally digests it. But with my poor mental digestion—so rebellious—the “bony spines” stick horribly. And how do “these vertebræ *throw out* bony spines or rays”? “Then some of these rays dropped off.” How did they manage that without any *design*? As easily as they dropped on, or “grow’d,” perhaps. While “others coalesced into more complex forms,” resulting at last in the human hand! Now how did they manage—these fish-bones—to *coalesce* with such varied results as the human hand and the horse’s and the ass’s hoof? Was there no *design* either within the fish-bones or without them, to lead steadily up to that wondrous result the human hand? Whose design? The design of the fish-bones themselves, of course; not of God. Truly God is Patient.

I am surprised that so deep a thinker as the author of the book we are reviewing should have found himself able to adopt this “quite recently” enunciated dogma—the offspring of Darwinianism—of No Design in Creation; not even in the creation of the human hand I prefer to keep to the old faith; in the firm faith that it is the truth; which will never yield to the “quite recently” formed conceptions of theorists. This accepted Modern Thought in my opinion represents man’s error of judgment, which is always changing about, and is as cloud hiding the truth. But the truth remains and it is only the errors which change, and the clouds which pass away.

The good Earl of Bridgewater appointed sums to pay for the best “Treatises on the Power Wisdom and Goodness of God as Manifested in the Creation,” and very good results were obtained, one being Sir Charles Bell’s beautiful work “On the Hand.” And it appears to me one of the most wonderful and inexplicable of the developments of other minds—minds of calm scientific English gentlemen—to labour to undo and discredit the good and divine work of men who carried out the good Earl’s reverent and beneficent wishes. Truly God is Patient. And they seek to do all this mischief with such flimsy batteries, although some people, who ought to know better, deem them to be as effective as they are noisy.

Curiously, the fishes still remain fishes with their fins unaltered

and the reptiles still remain reptiles with their so-called “rudimentary limbs ;” and the birds and the bats still remain birds and bats, with their “ long fingers supporting the feathered wings of birds and the membranous wings of bats.” So also when these fish-fins ultimately “ coalesced into solid limbs supporting the bodies of large animals as in the case of the horse ” the horse’s legs continue horse’s legs ; and the hoof is as far as ever from the hand of man ; as the horse finds to his cost ; and the hand of man bears no more resemblance to the hoof of a horse than to the fin of a fish.

I know that a drawing has been made shewing how the fishes still remain fishes and retain their long spines unaltered, yet developed to something else, until their fin became the human “fin.” So did an ingenious Jesuit long ago make a drawing of the Holy Trinity on a church wall somewhere in Bolivia, South America, to assist the comprehensions of the early Christian Indians there ; which diagram either before or since that Jesuit’s time, has found its way into heraldry. But these things remain mere ingenuities, not truths.

I remember also making some diagrams for you, once upon a time, shewing the connection that may be made to appear between black and white ; and between a square and a circle. So you may place a minnow at one end of your street ; a man at the other end ; and a horse in the middle ; and make, or imagine, forms which shall gradually connect each with each other ; and shew how the man may have descended from the minnow. But this connection is all the work of our imagination ; and the imagination proves no succession of development. And even if such development were possible and had taken place, it proves no self-creation and no self-development. Every step of change from the preceding model would be a new step and act of creation. And if God should choose so to work, is it for the creature man to criticise His work, and seek to dethrone his Maker for having made man himself in such a manner ?

The mention of Sir Charles Bell and his book “On the Hand”—which however was not published thirty years ago, but about sixty years ago—reminds me of a curious mistake which I wrote in my copy of that work. It took place when I was studying and practising art, in my boyhood, at Somerset House, London ; just before the removal of the School to Marlborough House, during the minority of the Prince of Wales. Among others of my masters of various depart-

ments were Mr. Herbert, R.A., and Mr. Redgrave, R.A. One day I was drawing in black and white chalks on tinted paper a foot of Ajax from the plaster model. It was a foot of the colossal Ajax in the attitude of defying Jupiter and his thunder-bolts. I remember I had some manner of working which differed—I don't now remember in what particular—from the ordinary habit of students; which, at first the masters objected to. But the habit was natural to me and continued, and the masters watched in silence, and at last approved; and I overheard one say to another "Let him alone." While I was drawing the foot of Ajax, as I said, one of the masters brought a gentleman to look at my work and mode of working; after which the stranger paid me some compliment; and I understood the master to tell me afterwards that it was the great Charles Bell; and I wrote in my copy of "The Hand" these words:

"While I was drawing the foot of Ajax from the round, in black and white chalks on tinted paper, Sir Charles Bell came and looked over my shoulder, the drawing being nearly finished, and paid me a high compliment. That was Sir Charles Bell 'On the Foot.'" But it turned out to be all a mistake, either in my hearing, or the master's speaking. Sir Charles Bell had been dead many years, and it was the great *John* Bell, the divine sculptor; not Charles, the divine anatomiſt. Talk of divines! these were the true divines; and they humbly acknowledged the Divine Power whence they derived their divinity of power to work. But this chalk drawing, which is now before me, will help to support the purpose of good Sir Charles Bell, and the good though eccentric Francis Henry Egerton, eighth Earl of Bridgewater. To deny Design in the creation of the Hand is like denying the Design in the work of this hand of mine in this drawing; and reducing the drawing to its molecules and atoms; and declaring that they have all arranged themselves in this drawing either by themselves or by Law; and that the molecules of chalk are not arranged by the work of my hand in obedience to the design of my mind, in drawing the foot and interpreting the roundness by lights and shades on the flat in my own way. And it would be less wonderful for mere Law, in the Agnostic sense, to bring these molecules together, as in this drawing, than for the same mere Law to build up from molecules and atoms, protoplasm and cells, the hand which made this drawing, on which I now look—the foot not the hand—and recall the busy days

of my youth.

And the attitude of this Ajax defying the Thunderer, is the attitude of the so-called Agnostics in denying “The Power Wisdom and Goodness of God as Manifested in the Creation.”

This letter is long enough, and I will beg to return to the subject in my next.

LETTER XXIX.

THE AGNOSTIC DENIAL OF DESIGN IN THE CREATION.—BACTERIA AND THE WORLD OF PARASITES.—THE SERPENT, THE SLUG, AND THE CENTIPEDE.—BENEFICENT DESIGN IN BOTH JOYS AND PUNISHMENTS.—EVIDENCES OF DIVINE DESIGN IN ALL NATURE.—THE ORANGE PIP, THE BUTTERFLY AND ITS BLOSSOMS, THE CAMEL, THE TORTOISE, THE HUMMING-BIRD, AND THE BIRD-OF-PARADISE.—THE COMMAND TO MAN TO SUBDUE THE EARTH.

16 APRIL, 1892.



TURNING to the Agnostic denial of Design—or the Power Wisdom and Goodness of God as Manifested in the Creation—the more I think about it, the more astonished I am at feeling called upon to argue upon the subject. It is incomprehensible to me how it can ever have become a question. I cannot look anywhere—above, below, around, or within, without perceiving indubitable and beneficent Design. But from the sight of others it is hidden; and the dangerous wall, upon bad foundations, which has been erected to obstruct this view, must come down, even with the trouble of pulling it down.

On page 96 Mr. Laing says: “If we are to adopt the theory of design and special creation, we must be prepared to take Burns’ poetical fancy as a scientific truth, and believe that Nature had to try its ‘prentice hand,’ and grope its way through repeated trials and failures from the less to the more perfect. Again, the theory of special creation must account for not only the higher organs and forms of life, but for the lower forms also. Are the bacteria, amœbæ, and other forms of life which the microscope shows in a drop of water all instances of a miraculous creation? And still more hard to believe, is

this the origin of the whole parasitic world of life which is attached to and infests each its own peculiar form of higher life? Is the tape-worm a product of design, or that wonderful parasite the trichina, which oscillates between man and the pig, being capable of being born only in the muscles of the one, and living only in the intestines of the other?"

Surely man ought ever to approach the study of that Creation of which it is his high privilege to form a sentient and greatly favoured part—O how small a part, and how greatly favoured!—with deep humility; very very deep humility. But, in the foregoing passage is there not a ring of assumption, and an arraignment of Nature—as God's Art of Government—which may possibly be the result of mere want of knowledge? I do not mean especially on the part of this eloquent and able author. He is not the originator of these thoughts; but the mere exhibitor of them as academical conclusions. Is any man competent to declare that Nature has had to grope its way through repeated trials and failures? And that the bacteria, amœbæ, and the whole parasitic world of life are failures, or worse than failures?

So far as I have been able to make out, all the creatures here denounced as failures or pests, are blessings; and not only in the probable and seeming joy of their own existences, but in the duties which they perform as correctors of evil; such as doctors, nurses, and scavengers do. What we call evil is a mystery to us and undefinable, because of our want of knowledge of final consequences. What seems evil to one is good to another; and we have no right nor reason to condemn Nature for what we cannot understand in its operations; but rather to humbly trust in, and adore, The Power Wisdom and Goodness of Nature's God as Manifested in the Creation, so abundantly, to our sight and reason.

The creation of the serpent is a mystery; but not to be arrogantly condemned by man as a failure because *he* does not *understand* it. And some people think a slug a nasty thing and a mistake. I admire both the serpent and the slug, having made pets of the former, and watched the latter grazing in a pasture with intense interest. It eats herbage like a horned ox, seems to enjoy life, and has a physical mechanism, although so simple, completely adapted to all its needs. It is no failure. And the serpent, so very simple in structure remains

a serpent still in spite of Evolution. And yet its structure exhibits wonderful Design in effecting the accomplishment of all the serpent's needs, with mechanism so simple.

To say there is no Design and no special Creation in Creation, because the sayers think, from their defective point of view, that there are some mistakes in some general forms of life, is more than unwise. One might as well say there is no Good in life, because there is some Evil ; and no Joy in life, because there is some Sorrow. The serpent, the slug, the centipede, and the parasites, loathed as they are, are each perfect, with all their differences ; and have their allotted duties in the Creation of which they form part. And the fulfilment of those natural duties doubtless constitutes the joys of their lives. That is the beneficent rule of life : another evidence of design. The young child is destined to grow and it obeys nature by eating and drinking constantly ; and finds its greatest joy in "taking supplies of fresh matter into its inner laboratory." This I call design, that the physically perfected man or woman may be the result. But it is not the design of the child, which only acts by natural impulse. This beneficent rule of life seems with some creatures to be accompanied also with a uniform punitive rule ; apparently a destined punishment or expiation for some wrong "behind the veil" of the past. Still beneficent design.

And now let us glance from the slug which feeds in pastures like an ox, and can glide about without legs, and lay hold and climb without hands, so beautifully are its means designed to accomplish all its life's needs—from the slug to the perfected man and woman. Language and literature are developments of important powers given to man, and not created by him, nor by protoplasms—but given with the design which they have long been accomplishing, of concentrating and accumulating human thought, knowledge—science ! It is curious to watch two or three people in the distance, in conversation which you cannot hear, but in a manner can partly see, by the action and expression of countenance. We know that thoughts are being conveyed from mind to mind with exactness ; and in wonderful variety and complexity. Man seems to be the inventor of his language, and his fashion of change—or change of fashion—therein ; gradual change leading ultimately to entirely differing sets of sounds and meanings in widely separated communities. But the expression and com-

munication of thoughts from man to man, and especially from woman to woman, by sound-signs is a perfectly natural act, however it may have had its beginning, for which the human apparatus of language was evidently designed in the creation of man as he is. The organs must have preceded the language, or been simultaneous with it ; for the language could not have preceded the organs and so developed the organs in the first instance. With man's destiny of Progress in thought, science, and action, was given the means ; which are language and literature ; both perfectly natural human developments ; the results of Almighty Design I would humbly suggest ! It seems to me too big and extraordinary an occurrence to be either a mere accident, or a scheme of the protoplasms in their cells.

Development without Design ! that is what we are taught in this chapter on "Life." Has my poor mind a natural and hideous squint, that it cannot see this thing ? And how is it with those who *do* see it ?—who see that a headless senseless mite of protoplasm in a cell—little prisoner too—can of itself, without design internal or external, unless it be the design of, or in, its own molecules or atoms, develope to a god-like man ! With this power of development the little protoplasm in the cell must be God Himself—Himself divided and repeated ; yet connected ; in each cell ; each a part of His Infinite Self. And why not ? That is all we want. And then comes the Design with the Divine Development. And man himself becomes even more of a god than we gave him credit for. How else could the protoplasms *self* increase, and of themselves construct a living man, with all his surging passions and powers, loves and aversions ? But, alas, the pig has a similar organism. Dead or alive these protoplasms in their cells are but as the separate stones of which an Alhambra Palace is constructed. But God is in no hurry to be vindicated. With Him there is no such thing as Time. Even His flowers grow slowly, and blow slowly ; yet they come and go with certainty and fast enough. So will the flowers of Truth gradually reveal themselves and blossom—immortelles and amaranths ! In his humblest natural condition man feels himself, without telling, so encompassed with design for his good and his joy, that the equally natural result is reverence and gratitude to the Great Unknown ; whom he worships and to whom he prays—the Great Unknown yet evident Power, evident in all things. But this curious being, man,

when he ascends from that humblest natural condition to the more favoured—much more favoured, much more richly endowed with designed blessings—instead of increasing in thankfulness becomes irreverent and ungrateful ; and he denies the existence of any Designer, Giver, or Benefactor ; and sets it all down to a vague Law of atoms, molecules, and protoplasms ; which he cannot by any possibility make any clearer to his understanding than the idea of an Infinite, Beneficent, Designing God ; but which is much more difficult to believe. Yes, while the Agnostic eats his orange, his pine-apple, and his peach, he declares there is no beneficent design in their provision for his use. Yet when he was a poor labourer he returned thanks for his potato, his turnip, and his cabbage, as blessings evidently designed for his benefit, and worthy of gratitude. Still more remarkable than the potato is the indulgent beneficence and its design in the richer gifts, and man's inborn tastes to enjoy them. And when you look next into the interior of an orange, behold there the evidence of the design for the future production of oranges in the presence of the pip—beneficent design. Yes ; truly Allah is Allah ; and the Agnostic is not His Prophet : the Agnostic who eats his orange with its pip, his crowned pine-apple, and its kernelled peach ; declaring all the time that there is no God. And God is so patient that He does not even choke His ungrateful rebel creature with His witness the pip.

Returning to the question of the parasites : I ought to have observed that where they are found and abound, they are needed scavengers. They are there, because there is their food. And the same cleanliness which renders their presence unnecessary, secures their absence. They are not Nature's mistakes, but Nature's beneficent precautions and remedies, and all evince beneficent design.

I remember to have dwelt on the subject of the tapeworm and the trichina in one of the earliest of these letters when discussing the air-germs. I stated then that internal parasites are, like those that are external, beneficent scavengers ; and that the presence of the trichina meant a state of flesh or blood so impure through wrong-living as to need the hideous consumer of impurities for the arrestment of a greater evil than itself. And that the tapeworm was equally a needed scavenger wherever found.

I expressed some thoughts on the subject of Design and Creation

versus self-development in the Addendum to "Cloud Hill," of which I sent you a copy some years ago in the form of a newspaper-cutting nearly nine feet in length of very small close print. In case it should not be now at hand, I will repeat what I said there on this subject :

"Those who deny the possibility of animal existence in an atmosphere containing more carbonic acid than that which we now breathe are not only biologically ill-informed, but they strangely lose sight of that marvellous adaptation of creatures to the places, conditions, and times assigned to them, which we see everywhere in operation. And this adaptation of which I speak is not a gradual self-adaptation, as some philosophers wish us to believe. In vain would the first butterfly have burst from its tomb to the resurrection of the glorious summer, had there been no floral chalices of food provided for it, and adapted to the support of its life. And in vain would the floral chalices of nectar have been provided for it, had the lovely thing been unendowed with its dipping proboscis so peculiarly adapted to its purpose of sipping up its food from the recesses of the blossoms. If it be true that the camel possesses an extra water viscus for its reserve supply in the thirsty desert, I should also say that the first camel, when he started from his first oasis, and found himself thirsty on his long journey, must have been already provided with his water stomach and his water reserve, or must have died, and his race with him, before accomplishing self-adaptation to the circumstances. And we now learn that the *Testudo Gigantea*, the great tortoise of the Californian desert, is actually provided with a couple of water-bags, or loose lining to the interior of its carapace, containing an extra store of about a quart of pure water, derived from the cactus leaves on which it feeds, and provided as a reserve for the use of the tardy traveller in his journeys from one cactus oasis to another. This provision, also, was necessary to the first journey in the desert of the first of his kind. And we see this forecasted adaptation all around us. Self-adaptation to circumstances, whether of the butterfly on the rim of his nectar-cup, the camel in the Sahara, or the tortoise in the Californian desert—in all animated nature—to be left to self-adaptation would mean, left to perish!"

Then look at the design manifest in the deposition and incubation of the eggs of the wife of the above butterfly!—the eggs which she forsakes as soon as she has safely glued the last one to the leaf, as if

knowing that her duty is done, and the sun will attend to the hatching which the sun unfailingly does. Is not all this evident Creative Design? Then look at the design of the gorgeous humming-bird and the bird-of-paradise—glorious designs in themselves—how they prepare their nests as if with fore-knowledge of what will presently happen, and all in such good time. And there they deposit their pretty eggs and with patience hatch them themselves, unlike the butterfly, because the sun will not do it for them; all working equally by Creative Design for the birth of fresh joyous life. And when the young birds are hatched, all naked, unadorned, and helpless, see the further gradual fulfilment of the design to reproduce the finished glories of the species; by means of the parental unfailing care in supplying food and warmth, through that designed parental love, which shall be maintained only until the strength and glory of the young are completed. Then they shall be sent adrift no longer cared for. Such was the design and such its fulfilment.

Now let us return again from the butterfly and the bird to man. Man himself is an evidence of omnipotent design. He was ordained to replenish the earth and subdue it; his advent and conquest involving the destruction of races of creatures whose destinies on this planet are therefore evidently accomplished; their appearance here, and their disappearance being to us unsolvable mysteries. The command to subdue was recorded, not after its accomplishment, but when men were few; and strong, fierce, naturally-armed creatures were very numerous, and everywhere recognised the tender new comer as their subtle foe. Now, thousands of years later, we see that man, naturally naked, and naturally unarmed, could easily accomplish this mandate. With the Divine command and design, was given the divine power. Does no one see in the family loves, the Divine mode of carrying out the Divine design of subduing and populating the earth with mankind? Conjugal and parental loves—stronger and more lasting than the loves of all other creatures—are the evident and irresistible means of accomplishing the evident design, and the means in themselves are also design, as well as evidences of Almighty Power Wisdom and Goodness. And we are coolly asked to believe that the protoplasms in their cells do all this mighty work, as it were, by a law which they each carry about with them, and of their own power and will and knowledge, as if they without heads or hearts, know what

they are doing, and so do it, and accomplish this replenishment and conquest of the earth in accordance with their own mandate, since the existence of God is denied. But they are the mere material with which God ordains the building up of His creatures, and how He does it must ever remain a mystery beyond the grasp of the comprehension of even our own divine intellect.

It seems to me that more yet ought to be said against this chapter on "Life," which I will beg leave to say in my next letter.

LETTER XXX.

DESIGN IN THE CREATION ; CONTINUED.—THE VOICE OF THE INFANT.

—THE BALLOON AND ITS INFLATION.—MAN'S YEARNING FOR WINGS WHICH NEVER COME.—INVOLUTION PRECEDES EVOLUTION.—EMBRYO MAN IN A FISH.—THE CLOCK OF LIFE.—PIGEONS.—THE SCULPTURES OF THE ASSYRIANS AND GREEKS.—THE STRUGGLE FOR LIFE.—TEN LITTLE PIGS.—FURTHER EVIDENCES OF DESIGN IN CREATION.—DESIGN IN MOTHER'S LOVE.—THE AGNOSTIC DEPOSITION OF GOD, AND DEIFICATION OF HIS CLOCK IN HIS STEAD.

21 APRIL, 1892.



ONTINUING our reflections on the theory of physical self-development, we know it to be true that the Infant, by the exercise of its voice, assists the development of the already created organs of that voice. But that is a very different thing to creating its own voice organs. Being created they grow, by the mystery of life, and the growth is a continuation of creation, assisted by exercise, up to maturity. The organs of the matured voice are in the embryo, and they are only capable of development to their normal limit, beyond which no exercise or self-effort will carry them. The development of the embryo, with its omega of attainment by means of life and exercise, must not be confounded with a limitless evolution by means of life and exercise. I take it that if ever an embryo be capable of developing a stage further on, it is a new creation from a new design ; whatever may have been the Divine mode of its creation, and not a mere self-evolution.

Man's development, leaving out the mystery of life, appears to be something like the gradual inflation of a balloon from a state of compact collapse to its utmost capacity ; and when that is attained no further evolution or development is possible. To go further still in development or inflation, a new and larger balloon must be made ; and before it be made it must be designed. And thus the fishes remain fishes ; the reptiles remain reptiles ; and so on throughout creation. If an improvement should be made, or an alteration should be made, in the human model by the addition of a pair of graceful and useful wings, enabling man to use the air like an eagle, I should call that decidedly a special work of God ; and not a work of man ; or protoplasms ; or nothing ; which the general idea of evolution would imply. And as to the human form and functions thus far, judging from the Assyrian sculptures and the works of Phidias, there has been no change or advance since those days. There has been a vast accumulation of knowledge since then, and those ancients did their important part in bequeathing thought and knowledge to us. But there appears to have been no further evolution in man's physical form and powers. Yet what animal has ever yearned more than man for the said useful wings ? In his conceptions of a perfect or exalted humanity he adds the missing wings. There is said to have been no design in the wings of a bird. The creature with paddles *wanted* to fly into the air and gradually developed the power to do so. Why does not the far more intense yearning of man result in his power to fly ? He tries leaping too : why can he not yet leap like the flea ? As to his wings, there is no bud or bump or a sign of their coming yet. And what other creature ever had such earnest yearning and fierce desire for swift locomotion as he ? His mightiest energies and the mightiest powers of his genius are employed in trying to get himself and "his things" to and fro in the earth with increasing speed. For this he pierces mountains ; builds ships ; makes railways and trains ; takes captive all swift horses ; and he makes the captive lightning the bearer of his messages—he is in such a hurry ! Yet he has no wings ; and has not yet been able to evolve a sign of a mere bud or bump of a promise of them.

In the simile of the balloon I have expressed the thought which Mr. Farquhar uttered in one of his letters ; that there can only be evolution to the extent of previous involution. Thus if a fish is

capable of development to a horse or man, there must be the embryo horse or man in every fish. What a pleasing discovery for all those good people who *fasted* on fish last Friday—Good Friday! Should it be fasted or feasted?

On page 90 Mr. Laing asks : “ Is the world of life, like that of matter, a clock so perfectly constructed from the first that it goes without winding up or regulating ? or is it a clock which would never have started going, or having started would soon cease to go, if the hand of the watch-maker were not constantly interfering with it ? This is the question which the celebrated Darwinian theory attempts to answer, of which I now proceed to give a short general outline.”

Here is the clock idea again ; which, if it were good, would not eliminate Design ; for such a clock as that would evince the most Divine Design ; and all the more so for being so designed and constructed that the Divine Hand never more need be “ interfering with it ” ! Here is still the curious endeavour to send Brahm to sleep indefinitely after His construction of the ever self-going clock of the universe ! Why try to do that ?

The simile of the Clock in Creation is very good only in a very limited way. It applies very well to the action of the ever active cosmic laws of gravitation or attraction, and of repulsion or revolution ; from which all the “going” movements of all the heavenly astral hosts result ; with all passing and coming hours, and days and nights, and changeful seasons. It is reasonable enough to speak of what we see to be mechanical in nature as the result of a natural sort of mechanism, still controlled by the maker and upholder of the laws of that mechanism. But the simile fails altogether when an attempt is made to apply it to the wonderful results of the chemical action in nature connected with the subtleties of light and heat, and the mystery of life, with its varied developments and growths and maturities.

After various instances and illustrations of the “Darwinian Theory,” all as light as the feathers of Darwin’s pigeons, we have this :

“ The most precise and scientific experiments on this power of integrating, or summing up, a progressive series of differentials, or minute differences, between successive generations, are those conducted by Darwin on pigeons. He has shown conclusively that all the races of domestic pigeons, of which there are two or three hundred, are derived from one common ancestor, the wild or blue-rock pigeon,

and that the pigeon-fancier can always obtain fresh varieties in a few generations by careful interbreeding. Of the existing varieties many now differ widely from one another, both in size, appearance, and even in anatomical structure, so that if they were now discovered for the first time in a fossil state or in a new country, they would assuredly be classed by naturalists as separate species.

"This is the work of man; is there anything similar to it going on in Nature?"

Now this, instead of being an argument in favour of self-evolution from some natural standard to some other natural standard, weighs in the opposite scale. For the pigeons when no longer *interfered* with by man in their matings, gradually lose all their differences, which are distortions of immediate heredity; and their offspring in time go back to the original blue-rock type. This rather shews that Nature keeps to her models, and though man by artificial restrictions may cause them to be altered, Nature, as soon as left to herself sets about recovering them. So there is no argument here for natural evolution by natural selection. And the theory of natural advancement by natural selection will prove false whenever tested by leaving Nature to itself, as in the case of man to-day compared with the sculptures of Phidias and the Assyrians. And if natural selection told in the matter at all, we might expect it to tell most with men and women, who have the better means of selection and the keener judgment for selection, perhaps, than the lower animals. It is not at all Nature's mode to match all strong men with strong women, nor all the tall, nor all the most beautiful, nor all the most wise, in couples. The contrary proves more natural because the contrary happens. And especially are these matings quite promiscuous and accidental throughout Nature, when man does not interfere. Yes, it is man who *interferes*. How can the Divine Clock-maker be said to "interfere" with His Own Divine Clock—His Own Work? So far as I have observed all natural selection tends to keep up only the perfection of the original by acting in averages.

Mr Laing then proceeds to quote the theory of animal progress of development arising from the "struggle for life," and the survival of the fittest, saying :

"Yes, says Darwin," (continuing the last quotation) "there is a tendency in all life, and especially in the lower forms of life, to

reproduce itself vastly quicker than the supply of food and the existence of other life can allow, and the balance of existence is only preserved by the wholesale waste of individuals in what may be called the ‘struggle for life.’ In this struggle, which goes on incessantly and on the largest scale, the slightest advantage must tell in the long run, and on the average, in selecting the few who are to survive, and such slight advantages must tend to accumulate from one generation to another under the law of heredity. The cumulative power of selection exercised by man in the breeding of races is therefore necessarily exercised in Nature by the struggle for life, and in the course of time, by the cumulation of advantages originally slight, small and fluctuating variations are hardened into large and permanent ones, and new species are formed.”

Here is another serious charge against Nature, of actually raising a great many more children than there is food for; and then letting them struggle among themselves for the insufficient food that she has provided. This is in the same spirit as the assertion that Nature has had to “grop its way through repeated trials and failures.”

It is as though the proprietor of ten little pigs placed in their trough enough food for five only; and at the welcome sound of the rattle of the tin bucket against the trough, the little pigs start running from various directions to it; and the five quickest and strongest get there first, and keep possession, and eat all the food; and the five weaker ones ultimately die out through starvation. If that be what the “struggle for life” means, it is not true of Nature. And it is an utterly false charge against the Providence of God. By that Providence, as a rule, instead of systematic deficiency of food, there is abundance to feed all life that is not itself created for food; and all the latter life so long as it lasts; and there is certainly no natural rule whatever for death by starvation; although there is a very positive natural rule for death by capture, of the victims of the carnivora. The ten little pigs in a natural way do not find their natural food in one spot at one particular time, as in a pig-trough. It is scattered over the face of the earth, and just beneath the surface, and the weaker pig has just the same chance of getting it as the stronger. And so it is with other creatures in natural life. It is truly wonderful how Nature, left to herself, preserves her balances, with plenty and happiness as the rule; instead of this alleged cruel prevalence of

hunger and starvation.

If, however, the "struggle for life" mean the struggle against Nature's own carnivora, the theory is still without force and utterly valueless to shew how in the struggle for life the survival of the best with their accumulated inheritance of the best qualities, exalts individuals, so that they become as Gods and are able to become of themselves the originators of new and higher species. Nothing of the kind happens. And we have not a particle of reason to believe that species go on *naturally* improving to something better, by heredity, through the "struggle for life." The carnivora and their food are both perfectly natural appointments, the prey being certainly created for the carnivora to the extent that the carnivora consume it ; and in abundance for that purpose ; leaving a survival year after year and century after century amply sufficient to keep up the needed supply of food to those who are born or hatched to consume the victims. And this goes on in the seas and rivers and lakes, as well as on the land. I remember to have referred to this subject in some previous letter. The lower forms of life, and the higher too, are provided only in such excess of survival as is ordained to be eaten, not starved—not recklessly provided that they themselves may struggle, lose in the struggle, and starve to death. The absurd and cruel thing does not happen in Nature ; but, only, in some artificial human life, or connection with human life ; and it is wonderful that such a theory should have actually a crowded following of great philosophers.

This provision of carnivorous food includes an immense quantity of eggs, larvæ and pupæ, in which there is no struggle at all, and it is not the rule for the strongest swiftest and finest of the victim classes to escape capture by their natural captors. We have only to use our eyes to ascertain this ; whether it be the spider's fly, or the robin's spider ; the mouse's cockroach, or the cat's mouse. If Nature had given the command to her carnivora and their victims, "Now then, race for it !" it would have been another thing. The capture is so much a matter of accident as regards individuals, that the fleetest mouse may run only so much quicker than the slowest within range of the silent fatal paw. In every case between ordained captor and victim, there is more of accident than struggle in the capture ; and one individual is as likely to be taken as another. It is so with the frog's slug, and the duck's frog ; the rat's beetle, and the dog's rat ;

the swallow's gnat, and the hawk's swallow ; the fox's fowl, and the hound's fox ; the sailor's oyster, and the shark's sailor. And so it is with the hen's worm, the wolf's sheep, the lion's bull, and all the carnivora and their natural victims. The escaped victims do not become Gods through the cleverness of their escapes ; and so give to the Creation more and more exalted species.

When, however, a case happens which is not included in the foregoing quotation, and a race is divided against itself ; unnaturally as it seems, and not on account of hunger ; and carries on domestic war, that is another thing. That too often means domestic robbery and murder, with the survival of the greatest thieves, and the strongest and most cruel murderers.

Fighting for the lordship of the harem, as with cocks and bulls, is also another case ; in which the strongest and most courageous generally survives, but does not necessarily, nor probably, advance the standard of the species to something higher, or something else ; but his progeny will also prove of varying strength and the strongest will rule, without being a bit stronger than his ancestors who ruled. It is not necessarily a case of the extra strong surviving, but the extra weak having to yield to the normally strong. That is what we find by the observation of Nature.

In ancient human warfares it used to be, perhaps, a rule that the manliest conquered. But modern warfare sweeps down the fittest to survive, and the unfittest, with the same cannon ball ; and the accidents of biggest battalions, and best served guns have more to do with victories than individual manliness, or fitness to survive ; as in the late war between Prussia and Denmark.

I am reading the *Topsy* book—most touching book—just for rest late at nights ; and last night I noted this part of a conversation between the slave-traders :

“ ‘ This yer young-un business makes lots of trouble in the trade ’ said Haley dolefully.

“ ‘ If we could get a breed of gals that did’nt care, now, for their young-uns,’ said Marks, ‘ tell ye, I think ’twould be ’bout the greatest modern improvement I knows on,’—and Marks patronised his joke by a quiet introductory sniggle.

“ ‘ Jes so,’ said Haley ; ‘ I never could’nt see into it. Young uns is heaps of trouble to ’em—one would think, now, they’d be glad to

get clar on 'em ; but they arn't. And the more trouble a young-un is, and the more good for nothing, as a gen'l thing, the tighter they sticks to 'em.'"

Thus, contrary to the habit in lower forms of life, instead of neglecting the weakest as the unfittest to survive, the human mother bestows more love and anxiety and cherishing care upon them, than upon the strongest of her children ; and thus, in the very highest form of life the mother's instinct shuns the theory of the mere so-called survival of the fittest, and compensates natural weakness with tenderest and anxiously tending extra love and care.

There is another nice passage further on, in which the Quaker Simeon speaks words of wisdom to the run-away slave George, who is hidden in the Quaker settlement with his wife Eliza and their little son Harry :

" 'If this world were all, George,' said Simeon, 'thee might, indeed, ask, Where is the Lord? But it is often those who have least of all in this life whom he chooseth for the kingdom. Put thy trust in him, and no matter what befals thee here, he will make all right hereafter.' " This is all a matter of Faith ; but I have faith in it.

" And now Rachael took Eliza's hand kindly, and led the way to the supper-table. As they were sitting down a light tap sounded at the door, and Ruth entered.

" 'I just ran in,' she said, 'with these little stockings for the boy—three pairs, nice warm woollen ones. It will be so cold, thee knows, in Canada. Does thee keep up good courage, Eliza ? ' she added, tripping round to Eliza's side of the table, and shaking her warmly by the hand, and slipping a seed-cake into Harry's hand. ' I brought a little parcel of these for him,' she said, tugging at her pocket to get out the package. ' Children, thee knows, will always be eating.' "

And thus the child, as I have said, because Nature has made it pleasant to it to obey Nature's mandate to grow into man or woman, and fulfil its destinies—destinies of both joy and sorrow—"grows from within by taking supplies of fresh matter into its inner laboratory, where it is worked up into a variety of complex products needed for the existence and reproduction of life." Too simple a process, according to the Agnostics, to need any "interference" on the part of the above-named Lord of Life, present and eternal !

Surely the sweetness and niceness of the food which little Harry

"thee knows, will always be eating," in accordance with Nature's Design and mandate that he shall live and grow—surely that niceness and his appetite, the one fitted to the other, are one harmonious design—beneficent design, for the preservation of his life and the ensurance of his growth, according to design—his growth to designed manhood !

And so it is with the cherishing love of "these yer gals for their young uns." That mother's love and mother's toil—cause and effect—are themselves made the sweetest and noblest joys, as motive and reward—passing reward—for the "heaps of trouble to 'em" of protecting, nurturing, and rearing the next generation of god-like men and women. Is not mother's love design—beneficent design ?

I am afraid I am talking too wearily much on this "Life" chapter. But there is still more to say, including the Story of the Silly Genie from the Belt of Orion ; and I must really conclude the review of this chapter in my next. But just one more thought now :

The drift of the Agnosticism which we have under consideration appears to me to be the dethronement of God the Creator as a Ruling Power ; and the setting up *in His stead His Own Creation* ; as God ; but not God ; yet with God's Ruling Power ; and God's Preserving and Improving Power. And this usurping and deposing Creation of God—the Clock—is not only able to dispense with all "interference" on the part of its acknowledged Maker ; but has been, and is, going on, and ever will go on, improving itself, and surpassing itself, and surpassing its Maker. So the Creation itself has, in a manner, dethroned its Creator, seized His sceptre, and become a sort of Jupiter son of Saturn ; ruling in his deposed father's stead.

LETTER XXXI.

ARGUMENTS ON DESIGN IN THE CREATION CONTINUED.—THE FISH-FIN AND THE HUMAN FIN.—LAW OF LIFE AND LORD OF LIFE.—STORY OF A GENIE OF THE FIRE FROM EPSILON IN ORION.—HIS VIEWS OF THE EARTH, THE EARTHITES, AND THEIR WORKS, IN HIS THREE MESSAGES FROM EARTH TO HIS HOME-STAR.

28 APRIL, 1892.



KNOW that it will be said of my reference to the Assyrian and Grecian sculptures, and their record of the figures of men and women in the days of their sculpture, that three or four thousand years are as nothing in the annals of Creation—the passage of time, and its effects in the so-called Development of species. But I think it is abundance of time in connection with our argument. It is, in fact, *all* the time from which we can obtain any evidence either way. If three or four thousand years be insufficient time to shew any progress or change in physical man, through the operation of agencies said to have been all that time, and to be still, existing and operating, such as “struggle for life,” then there is no force in this summing up on page 92 of “Modern Science and Modern Thought ;” which I quoted in the last letter :

“The cumulative power of selection exercised by man in the breeding of races is therefore necessarily exercised in Nature by the struggle for life, and in the course of time, by the cumulation of advantages originally slight, small and fluctuating variations are hardened into large and permanent ones, and new species are formed.”

The last four words are very bold under the circumstances, like a good deal more philosophic dicta. The absence of the slightest confirmation of this theory in the instance of man, Asiatic and European, during a succession of, say, one hundred and twenty generations of men, in my opinion renders it utterly worthless ; small indeed as that period is in the natural history of this mite of a planet.

And why should we try to dismiss God from His Creation in this way ? Suppose that, in creating new species, the Creator has chosen to build upon His previous models, adding to, or altering, the structure in sequential correspondence with, and simultaneously with, the advancement of life and mental power ; or change of place and condition of living ; so that He has gradually made man out of a fish ; and the hand of man out of a fish-fin ; is it for man, because his Maker has chosen to adopt that Plan and Design, to object to it, and declare that there is no design in it ; and therefore God did not do it ; but man has developed himself ? Such an accordant sequentiality of creation and progress would appear to me, and I am sure it will appear to you, evidence of Divine Design and Divine Fitness. Any

proof, if it could be produced, of the gradual development of the hand from the fin of a fish would only shew Design and Forecast and Almighty Creative Power in the wonderful fin ; with its wonderful potentiality realized in this writing hand ; and I know my hand to be a work of Divine Power, Wisdom, and Goodness, however it has been brought about. The present wide acceptance of the theory that because it may be such a development therefore there can be no design and no Creator in the matter, will both amaze and amuse the thinkers of the future. If my hand has been made out of a fish-fin, I see quite as much need for the Almighty Power of God in the making, as if it had been made direct from a lump of clay, or a bagful of atmospheric air by the agency of a flash of lightning.

Instead of thus professing to understand the manner of our make, which we never can understand, and denying our Maker, or charging Him with groping His way "through repeated trials and failures," let us humbly reverence, as undoubtedly the Best, the Ways and Wisdom of the Creative Power, by whatever name we call Him or It.

Why the Agnostic denies that there is a Lord of Life, and admits a Law of Life, I cannot understand. We live by means of some Great Power ever operative, independent of ourselves, by which all things exist—the harmonious Universe—all subject to that Great Power. There can be no Law without Power ; and Will becomes Law with everlasting Power to enforce it. Then why squabble about calling it the Law, or the WILL of the Lord, God, or Great Spirit ?

Mr. Laing says on his page 89 : "Either all life or none is a product of evolution acting by defined law, and the affirmation of law is the negation of miracle." If there be "defined law" there must be a definer of law ; with the power of definition ; and then the whole becomes what we call GOD in action ; whether He be sleeping or waking ; for if it be a Clock, it is His Clock ; His Own Miracle, going by His power. How can this so-called Law, this Clock, be regarded as other than the most wonderful miracle of miracles in itself, rather than "the negation of miracles ?" But not supernatural, because it is Nature itself, God's Art of Government.

I will now beg leave to conclude these remarks on Mr. Laing's "Life" chapter, with the promised—

STORY OF A GENIE :

A little story, and, at the same time a big story, of a Genie of the

Fire, whose home according to the story is the central gem of that lovely Belt of Orion ; the gem known as Epsilon (ϵ) ; itself a magnificent sun. This genie, recently, when on a tour among the constellations, happened to reach our part of the Milky Way ; and paid a visit to the Ruler of our solar system. From space he had beheld our little speck of a planet like a grain of golden sand suspended among clusters of refulgent diamonds ; and having heard from the genii of the Sun something of the marvellous history of the place and its inhabitants, he one day plunged again into cold space on a visit to the Earth. I remember your writing to me on New Year's Day that you were gazing at bright Orion at the moment of the exit of decrepit old Ninety-one ; and the advent of the newborn Ninety-two ; and you observed that you thought his sword looked newly polished, and the great Hunter himself altogether brighter than usual. And you noted the bright diamonds of his Belt, and counted one, two, three— δ —Delta, ϵ —Epsilon, ζ —Zeta, but reading back on the star-maps from the right to the left. You little thought then that you would be so soon reading messages sent by one of the spiritual inhabitants of the central gem. Now please listen to the genie's own account of his visit in his messages to his brother genii at home in Epsilon of Orion. I will not stop to attempt to explain to you the secrets of the stellar telegraphy of the genii : it will be necessary to add to the human vocabularies before that secret can be conveyed to my readers.

But before the genie speaks I ought to say that, although so great a stellar traveller, and hailing from Epsilon in Orion, he is a rather silly genie, and has a habit, as you will find, of judging things too rashly from first appearances, and from too-easily-made impressions. You know the genii are far from omniscient, and not necessarily clever ; I say "you know" because this is proven by all we read about them in books. There are some good and some bad ; some very very clever, like Aladdin's Genie of the Lamp, and some very foolish. My Asmodeus, you may remember, was so foolish as to get himself hand-cuffed at last, by the angel Raphael, in "the uttermost parts of Egypt." And it served him well right. Some, you will have read, were even so stupid as to refuse to obey the mighty king Solomon the Wise ; and others were so obtuse, later on, that they refused to believe in the Prophet Mohammed, or Mahomet. Now for the—

First Telegram :

"Shivering with the cold of space I gladly plunged into the Earth's atmosphere of *fire*, for with such is it encompassed in the manner of the suns, but of less intensity. Curiously, the inhabitants, although the same heat if sensific to them would destroy them, live move and breathe in the flood of fire without feeling it or seeing it. To them it is latent, but is really sun-brightness condensed in atmosphere and water. Sometimes—constantly in fact, small portions of this light and heat are revealed to them by certain chemical action or combustion ; and when this does happen its locality becomes like the atmosphere of Epsilon, as our home is called by the Earthites. But the same amount of light and heat that is visible and felt in a great fire on the earth is ever present in all its atmosphere ; but latent to all its inhabitants. I am dwelling upon this, and trying to make it understood, because this latency of so much light and heat in the Earth's atmosphere is very curious. And it is so with the waters of the earth. They are really oceans, lakes, and rivers of fire ; their constituents being kept fluid only by means of the heat and light which they contain ; although to the inhabitants of the earth at night this glowing fire is completely invisible and unfelt. But to me, of course, this photosphere of air and waters was a brilliant hot bath of fire which I much enjoyed after the flight through cold space. So great indeed is the heat of the Earth's atmosphere that it holds diamond in vapour ; also the gems oxygen, hydrogen, and nitrogen, are held in it in the state of gas, besides the carbonic gas of the diamond—which gases, indeed, compose this fiery atmosphere. The inhalation and exhalation of these flames are necessary to the life of the inhabitants of the Earth. And you will hardly credit this ; the inhabitants of the Earth are all composed of metals and gems changed by heat ; the very metals and gems which in burning produce the brightness of Epsilon in Orion ; and of the Sun, the Ruler of this system. They are largely composed of the diamond, changed by heat, and the other gems hydrogen, nitrogen, and oxygen ; and the metals calcium, iron, sodium, potassium, and magnesium ; also phosphorus and sulphur. They not only breathe the flames ; but they drink the liquid fire of the lakes and rivers."

Now the silliness of this genie is not made apparent in any line of his message thus far ; for all this is perfectly true. But what follows

next is not true :

"I was much struck on alighting among men to find curious and beautiful structures arising out of the earth, and marvelled at such remarkable growths. They are called palaces, temples, tombs, monuments, and places, of seeming endless variety of design and beauty. And I find upon examination that these things have all grown up out of the earth in a marvellous manner. These remarkable and beautiful structures are each composed of innumerable separate squares of stone or brick. 'This is the primary element from which all the more complicated forms of life are built up. Each brick seems to have an independent life of its own, and a faculty of reproduction by splitting into fresh bricks similar to itself, which multiply in geometrical progression, assimilating the elements of their substance from the inorganic world so rapidly as to provide the requisite raw material for higher structures.'"

Second Telegram :

"I have already spoken of man as being wonderfully constructed of the same materials as the suns—those metals and gems which in their combustion give light, warmth, and life to the universe. The diamond enters largely into his composition, and, mingled with fire, he breathes its vapour forth with every breath. Men are the gods of the Earth and self-created. Women are the goddesses and are also self-created. In fact all the living things of the Earth, animal and vegetable, are self-created, with the assistance of law; and thus save the superior Gods a world of trouble. But I find I was in error respecting those structures called palaces, temples, tombs, monuments, and places. They are not living things self-raised from the ground, as I supposed; but are the work of the human gods; and I have since seen them engaged on these wonderful structures. The description I gave of the self-erection applies not to them, but to the self-creation of the gods themselves: only, instead of 'bricks,' you must read 'cells, with protoplasm in them.' And not only do the gods construct themselves in this way, as I have said, but every individual of the animal and vegetable kingdoms of the Earth, of which man is the god-king, and woman the goddess-queen, does the same. Leaving the work to each one, saves the gods and goddesses a deal of trouble. The protoplasm referred to is 'a colourless semi-fluid or jelly substance,

which consists of albuminoid matter, or in other words, of a heterogeneous carbon-compound (or diamond compound) of very complex chemical composition.' All Earth-life is self-created with the assistance of law, by the building up of these protoplasms just as I described the building up of the stones or bricks of the palaces, temples, tombs, monuments, and places. And the Design evident in all these self-errections is truly wonderful from inception to completion. The very first protoplasm, in the instance of man, designs the complete human god, and begins its work, of course, *alone*, which is very wonderful, with the *complete design*; and that design is steadily adhered to through every step of progress to the completion. In the first instance it grows, as I erroneously said of the bricks, 'by taking supplies' from the goddess-mother, until it has acquired the power of 'Digestion'—'which is the primary attribute.' Then it has a habit of 'splitting away' from the goddess, and taking supplies into its own 'inner laboratory,' just the right supplies; and contrives to build itself up with marvellous knowledge, and perfectly astounding creative skill, assisted by law. Yes; it is wonderful to see it taking its supplies—exactly the right and rightly proportioned supplies of sun-material; which it has taken care to provide in its laboratory; supplies of 'complex chemical composition,' of prepared metals and gems; passing each compound on internally to its proper locality and function; with the design of the perfected god always in view; and always being steadily worked up to by that baby. The self-creation of its bones is one of the wonders of the wonders of the little thing's ingenuity. First, of course, it provides in its laboratory, and then sends into exactly the right places, a dissolved compound, fluid by heat, of the metal calcium, the diamond, and phosphorus. The same with the teeth. The young goddesses have charming teeth and hair, which they make for themselves with peculiar care and success, that they may be attractive to the gods. They make their teeth in the same way that they make their bones, by selecting from their supplies the necessary metals, calcium and magnesium, and the solutions of diamond and phosphorus, which they have provided for the purpose; and these they carry internally to their gums, in a steady and constant manner, until their glittering teeth are completed, and made dangerously beautiful. So do they with their glorious hair and their nails. They convey the same materials to the proper localities of their divine

figures, and crown themselves with glory ; and tip their fingers and toes with loveliness. And when the human goddess has completed her make and finished her shape, she is very beautiful ; and I do not wonder that she used to captivate and enslave the genii of the highest heaven, who in its early days visited the Earthly Paradise. And, as I remarked before, to see her finished, self-finished, is to be utterly amazed at the Design with which she started such a divine work of mechanism and beauty and joy-radiant life, from so small a beginning. ‘And what a piece of work is man !’ These men and women are, indeed, gods and goddesses, and their Earth a Paradise !”

Third Telegram :

“ Yes ; the Earth is a Paradise, and full of wonders ; but man, its god, is, rightly, the greatest wonder of all. We genii of the Epsilon in Orion are greatly his inferiors. Yet if one of these gods happen to be *extra* clever, they call him a *genius* ! a custom which must have originated as a joke. Everything in the earth is wonderful because eyerything seems capable of rousing itself from inorganic dead sun-matter to self-made organic life, and the Earth is crowded with this life in a numberless variety of developments all of wonderful design and completeness. The various devices of these Earthites for self-locomotion are truly astonishing in their variety of fashion and suitable mechanism. The design and execution always accomplish the end. If a bird want to reach his food from a deep depository he makes his beak long enough to suit his purpose, as with the curlew. So does a butterfly make his proboscis long enough to reach into the recesses of the flowers. All animals are adapted to their food, and the food to the animals ; the design on both sides being harmonious and perfect. There are the strawberry and the grape, self-provided ; and man has provided himself, in his original protoplasm, with a keen appreciative taste to enjoy them. And so it is with all other harvests and all other living beings. And so wonderful is the design even in a seed, that some are self-projected considerable distances from the parent tree, that they may have free space to grow and flourish far enough from the parent. Other seeds in building themselves up from protoplasms in the parent flower, furnish themselves with vanes to act as wings, and they fly high in the air over wide spaces, emigrating to places far from the parent flower, and forming

new settlements where they know they are most needed ; as medicinal benefactors and food to fauna ; into whose structures they will be assimilated, and thus be promoted from a vegetable existence to take part in animal life. The design in such cases in the primary protoplasm is truly wonderful. In fact the whole Earth is made up of wonders innumerable ! To return to the animal world, a great many of its members furnish themselves with wings and fly in the atmosphere of fire, and their designs are glorious : others prefer to move on the surface of the ground, or just beneath it : while others again prefer the oceans and lakes and rivers of fire, and fly, or creep, or stick therein. The hermitages, or shells, which some of the inhabitants of the waters make for themselves are divinely beautiful. And they design them and make them without any external aid. I have watched them at work ; just as the human baby makes its own bones and teeth and hair, and goes on making them just as industriously and perfectly when sleeping as when waking. Some of these shells are so beautiful that I would fain bring specimens from the Earth to Epsilon ; but so great is their attraction to the Earth that I cannot remove them from it. Such is the impotence here of the light genii of the fire ! Speaking of teeth and hair again, more marvellous still are the eyes of the human goddess, with which she supplied herself even before she had acquired the power of independent Digestion. They are the most marvellous of all her self-created work. She makes these the chief gates to and from her soul. From thence she flashes enchantments into the hearts of the gods. Through these dazzling gates she receives the images of the presence of all things present round about her ; which things she still sees within when those gates are closed, or the things themselves have become things past and far away. They are a most wonderful contrivance and design of hers. They are most powerful magnets attracting not only the small flies, but the great among the gods. They are the gates of love and joy which are ever passing thence to others and from others to her. Yet they are so designed as to be also the flood-gates of her sorrows ; sorrows which flow out thence from her heart mercifully diluted in tears. Truly she has very wonderfully designed and perfected her own eyes, as well as her lips, her teeth, and her glorious hair ! You will begin to think that I, too, am smitten with the Daughters of Men. Ah well ! I am leaving here immediately ; the

object of my visit being accomplished.

I have spoken of our home as Epsilon in Orion, because it is so-called on this planet which has a pretty copious star-nomenclature. Orion is a constellation made up of a group of stars which the Earthites imagine to resemble a Mighty Hunter so named ; our home being one of the gems with which his Belt is studded. In company with the Hunter are two more clusters which are called his Dogs, the greater and the smaller. The brightest star of the Greater Dog is called Sirius, and the Dog-star. From this earth it appears the brightest star in all the heavens, except the Ruler of the Solar-System, and he only appears brighter because so much nearer ; for Sirius is really two hundred times brighter and hotter than the Sun. I intend to examine that star. Of course the star-clusters all appear quite different from this spot to their appearance from Epsilon ; and I seem to be in the midst of entirely new heavens. I am leaving here immediately, and intend to return to you by way of Sirius the Dog-star. I am gazing upon the Belt lovingly."

LETTER XXXII.

THE INFINITE AND THE FINITE.—FAITH CRYSTALLIZED INTO KNOWLEDGE.—ANTIQUITY OF MAN.—SOME PALÆOLITHIC IMPLEMENTS NOT FASHIONED BY MAN.—NATURAL FRACTURES OF QUARTZITES, FLINTS, CHERT, AND VOLCANIC ROCKS.—FLINT JACK.—PALÆOLITHIC FLINTS FOUND IN THEIR MOTHER-BEDS.—NILE VALLEY DEPOSITS.

8 MAY, 1892.



ROM the denial of God in His Creation, and from the darkness and dust through which we have been struggling, it is refreshing to pass to letters from your friend Mr. Farquhar, all radiant as they are with religious faith, and knowledge, and powerful reasoning ; the outcome of extensive learning and far-searching intellect. He has done me the honour to read the "Jewitt" book and also "Hebrew Captives" and has written about them most generously and kindly. But there is one expression in each to which he takes exception, viz., "Jewitt,"

page 416 : "Some thinkers think it wise not to believe what they cannot comprehend ; and they find themselves quite unable to comprehend a Cosmic government and that is because of the finiteness of the human intellect No intellect can grasp the idea of Infinite Space the smaller, which is the limited human intellect, cannot contain the greater, which is the Infinite."

And in "Hebrew Captives" page 109 : "It is beyond the comprehension even of the highest of the angels to grasp the ultimate Cause of Causes."

This last sentence is supposed to be spoken by Raphael, himself an angel, disguised as a Levite.

Mr. Farquhar's ideas of the human capability of attainment of complete and perfect knowledge, when the humanity is *ultimately divinely perfected*, are grand, and grandly expressed and supported in his last letter, with spiritual support. Of course I dare not say what that complete knowledge of the future may be ; and perhaps I ought not to judge of the present human-life condition of mind in others, by my own keenly felt very limited mental capacity, and utter inability to conceive either the Infinite or the Finite in Time or Space. That is, neither Time nor Space without end ; nor with an end. In my acknowledgment I have said :

"The Infinity and Eternity of God appear to me too awful to be ever comprehended by any but God Himself ; because the expansion of Thought to comprehend Him as the Infinite should be as infinite as He is. And in my romance, Raphael—himself an angel—is made to say : 'It is beyond the comprehension even of the highest of the angels to grasp the ultimate Cause of causes.' Which, as you say, means God Himself. It would be mere dogmatism to make such a statement direct ; because, as you also say, we cannot tell what the highest angels can comprehend. Yet so awful is the thought of the *ultimate Cause of causes*, to my mind, that it seems to me passable to let an angel say what is said in the romance. I find I cannot possibly comprehend the infinity in eternity and in space : yet I certainly believe that He and His universe are Infinite, even if only because I can no more conceive a limit than comprehend the limitless. And the 'some thinkers' of whom I spoke are those who in this dilemma decline altogether to believe in Infinite God and His infinite Cosmic government."

You remember those shocking words which passed between the spider and the fly? The spider said of the Orchestrion, to the fly—
“I suppose you *have* seen that and heard it?”

Fly. O yes; and have been inside it, and up and down every trumpet and pipe in it; and have danced upon its drums, tamboureen, and cymbals. It has always been my habit to examine things in general very closely. Few things escape me, and especially do I love to examine the *insides* of things.

Spider. And what do you make of the Orchestrion? Do you think it made itself?

Fly. What do you make of your gods? Do you think they made themselves?

Spider. That puzzles me. I can make nothing of it. I have given it up.

The spider had evidently been trying to think up to, and comprehend, the *ultimate* Cause of causes, and utterly failed, as I have utterly failed.

Our friend writes: “Where one can be anywhere according to his affections and will, and where Past and Present are Now, time and space have no real existence,” and “The whole visible universe might be reduced to the size of a boy’s marble and we should never know any difference, since our perceptions would be accommodated to the relative dimensions of all objects, the sense of space being thus a condition, not a reality for man or angel.”

If the whole visible universe might be reduced to the size of a marble, which its *matter* would prevent, then the rest would be quite true; and easy to understand; because we are speaking only of the *visible* universe. The same, however, would not apply to an infinite, boundless universe. Because the *infinite* must still remain and expand undiminished outside the limits of the marble. Being infinite the *whole* must be incapable of contraction; and that whole I do not understand; and cannot conceive or comprehend; yet I believe there must be infinity in the whole, because neither can I conceive any limit to it. My mind cannot get rid of the difficulties of the expressions “Everlasting past” and “Everlasting future,” by wrapping them both in the word “Now.” I don’t object to the expression “Eternal Now,” it is one of my own, as applied to the Eternity of God; but it gives me no grasp whatever of Eternity. And the ex-

pression "ultimate Cause of causes," leads the mind to the awful contemplation of the Origin of God, Who had no origin. I suppose I cannot see so far as those who find no difficulty here. To me these thoughts are awful ; and when I strain my mental vision to its utmost, in contemplating these things, I seem to find myself on the edge of a dreadful unfathomable precipice, which has a fascination to draw me into it, and my mind starts back from it with horror. I have met other great thinkers, besides our friend, who do not follow me in this view of the Infinite and that part of it which we call the Finite. I think there must be one of two reasons for it : Either they do not get so far on in the finite, or limited, as to the edge of this precipice, which I find the limit of my power of penetration ; or, they get not only so far, but are able to stand on the brink, without awe, which I cannot do. I believe the latter is the explanation. I feel sure that it is so with your friend. He says in his last letter to me : "What I do not know or understand is no matter of faith so that I can predicate of it, 'I believe in God the Father Almighty' more than I believe in anything, or any person, because I know His character and unchangeableness better than I know that of my own or of any other."

How different is the spirit of this expression of faith to that spirit of rebellion which would dethrone God and snatch from Him His Own Clock, denying that it is His. Our friend's letters are quite luminous with this strong faith and love—faith so strong that it has crystallized into *knowledge* for he says "I believe," "because I know," and that comes of his observation and appreciation of "The Power, Wisdom, and Goodness of God, as Manifested in the Creation," which our Agnostics "Don't know" because they won't know ; and they are at such pains to try to destroy the edifice of Faith and Knowledge so beautifully added to by means of the good Earl of Bridgewater. On the contrary your friend has become so spiritual, so sure of the Promises, and such a seer into the Scriptures and man's future inheritance, that he almost counts the promises as things accomplished—as we should say of a good Bank Note that it *is* five pounds, or ten pounds—and he feels almost already exalted to the realization of his divine inheritance. That is what I make of his letters after repeated perusal. He seems to see things from other levels of view than the ordinary "plane of phenomenal observation and reasoning." Some will say that there is no real sense in such an expression as "faith so

strong that it has crystallized into knowledge." But he says "I believe," "because I know." It is like his faith and knowledge that there is carbonic acid gas in the atmosphere, although unseen and unfelt. Yet he knows that it is there as surely as he knows that the diamond is the pure and simple crystallized carbon of that same gas brilliantly visible and tangible.

Let us now further watch the Agnostic efforts to pull down the structure which the good Earl of Bridgewater sought to strengthen—efforts to shew instead that there is no Power nor Wisdom nor Goodness nor God nor Creation—because there is no Creator and no Design !

The next chapter of "Modern Science and Modern Thought" is entitled "Antiquity of Man," and opens with an account of the discovery of stone celts, arrow-heads, and other implements buried in strata or deposits, which it is presumed must have been deposited tens of thousands of years ago. I do not see, at this moment, any reason why God should vacate His Throne if it should be found that man has existed for ten or twenty thousand years, instead of six or seven thousand. But I do know that the hand of man had nothing to do with the shaping of the stone implements so discovered. They are to be found more or less in every gravel district, and I have many hundreds of them actually gathered from the Grave-mounds of the Palæolithic men ; but the Palæolithic men did not fashion them. They also *discovered* them, and found them "just the thing" to tip their arrows with, and for other uses according to size and shape and sharpness. I have seen great numbers of these things exhibited as the early work of man ; when they are really the work of Nature's storm-blows. The natural fracture, by natural blows, of flints and quartzites and chert, and volcanically melted rocks, and even lump glass, yields splinters like rude arrow-tips and celts and scrapers and knives. Where such rocks are abundant and have been broken up by violent storms these things may be found, but the sharpness and shape will soon be worn away by ordinary tidal and wind-and-wave action, unless they accidentally escape this action, as those we find have escaped.

Nature in her many storm-blows of flint against flint gives a certain average of blows as successful in producing rude arrow-heads, as the blows which Flint Jack gave when he produced thereby similar

things out of nodules of flint. Having thus splintered them, Nature left them as flint-flakes, and her next operation was to pound them gradually to sand. You will remember that Flint Jack produced them almost as rapidly, by mere blows, and handed them round to his company of geologists for rapid sixpences, as I have shewn in the "Jewitt" book. But he gave the natural flint-flake a touch or two with an iron nail or rod, and that made them more Neolithic in character, than the rudest Palæolithic examples which are all natural splinters. Flint Jack produced what are regarded as the rudest Palæolithic examples, without any shaping or trimming at all, just as Nature produces them, by mere rude blows. The next stage he produced by a very few touches of chipping with his iron nail ; and so on to his most beautifully finished Neolithic examples—*new* indeed ! That some early hunters used the naturally formed flakes, and other naturally formed stones, is certain. And they were so far valued as things and property, in parts of the country where they were not found in natural situ, that they were piously placed in the tombs or grave-mounds of the great hunters or warriors who had owned and used them. But the early or palæolithic hunters found them in gravelly districts just as Monsieur Boucher de Perthes, residing at Abbeville, found them in the slopes which bound the valley of the Somme. This is the true history of the rudest of these stone implements. It was very natural that man should very soon take to chipping them into better shapes when it was found how easy it was to chip flint with flint. And this work of chipping once commenced by some ingenious boy, how long would it take to progress from the palæolithic to the neolithic ages ? Shall we say ten thousand years ? Or shall we say ten years ?—a good long apprenticeship of ten years ! When a clever boy *once began* to chip these flints into some improvement upon nature, depend upon it he would be very handy at it in ten years. I am giving him a *long* time. Jack advanced from the palæolithic to the neolithic in about ten days. It is so very common for antiquaries to be taken in in these matters at both extremes, and all along between the extremes. I have watched them in error over the rudest palæolithic as well as over the latest neolithic which latter they nevertheless considered ten thousand years old, when, the example was so truly *latest* neolithic as to be Jack's.

A Reverend friend of mine in the Isle of Man had a great treasure

of this sort which had been dug up there. It was a rather heavy wedge of quartzite with a rather sharp edge which he concluded had been hand-made. He sent it to London to one of the most trusted authorities on such things for authentication, and it was authenticated as beyond doubt a stone implement shaped and used by ancient man—a celt. When I was there he exhibited it to me with exultation. I immediately said “This is the work of Nature. This wedge-shape fracture is natural to this rock under certain natural conditions.”

“No,” he replied, “you are mistaken. Professor—— has seen it and pronounced it to be a genuine celt.”

“It may have been the property of a genuine Celt, and have been used by him, but the shape is Nature’s own work, and there is no appearance of its ever having been used at all, and its surfaces are quite natural, and have not even been rubbed or polished by man.”

My friend was vexed at this, because the stone was such a treasure. And he would not believe me because Professor Scratch had confirmed his hopes that it was genuine human work. Llewellynn Jewitt was with me, and examined the thing, and he himself was one of the best authorities in the world on old or new stone implements ; but he was not a mineralogist, and said that although Professor Scratch was a very great authority in archæology, he himself should rely upon my judgment in a question of *natural rock fracture*. I then went down to the coast with Llewellynn Jewitt to a spot where I knew that rock to be in situ, and easily accessible, and looked about. And presently I put my finger on a loose piece in the mother rock, a piece which was ready to drop, or “split away” from it the very next time of wave-lashing ; and I said to my friend “Take this out of its mould with your own hand ; it is Silurian quartzite like the implement in question.” Llewellynn Jewitt took out the loose fragment ; and, behold, it was another wedge-shaped implement ! My Reverend friend looked sad when he saw it, and seemed to regard me as one who had cruelly deprived him of a treasure ; for he dearly loved that stone, although he had a wife and children also dearly beloved.

I have a fair collection of genuine stone celts, hammers, and arrow-heads, true works of early art, and some very beautiful ; and I have hundreds of what are called the earliest and rudest palæolithic, which bear a rude resemblance to the others, and are declared to be

the work of man's hand. But they are not ; they are simply the works of howling surging storms and the battles of the flints on the ancient sea beaches.

Thus the rude stone implements found in gravel and other deposits bear no witness whatever to the antiquity of man. Instead of their passing from the hand of man to the gravel and other deposits where they are found, they passed in what is called the palæolithic age from the gravel and other deposits, to the hand of man ; just as they do now.

You see these things were found, and are found—for they are utterly inexhaustible—all over the world. They prove too much. Mr. Laing says of them on pages 109-11 : "The spell once broken evidence poured in from all quarters, and although twenty-five years only have elapsed since Mr. Prestwich's paper was read, the number of stone and other implements worked by man, deposited in museums, is already counted by tens of thousands, and they have been found from Devonshire to India, in France, England, Germany, Spain, Italy, Greece, Northern Africa, Palestine, and Hindostan, *and in fact wherever they have been looked for*, except in northern countries which were buried under ice during the Glacial period. Some idea of the immense number of these rude implements may be formed from the fact that the valley system of one small river, the Little Ouse, which rises near Thetford and flows into the Wash after a course of twenty-five miles, has within little more than ten years yielded about 7,000 specimens.

"They have been found in great abundance in the valley gravels of the Thames, Ouse, Wiltshire Avon, and in fact in all the river gravels and brickearths of the south and south-east of England ; and in those of the Somme, Oise, Seine, Loire, and all the principal river systems of France ; and in less numbers, probably *because they have been less looked for*, in similar situations over an area extending from Central and Southern Europe to Madras and China. It is a remarkable fact about these river-drift implements that they are all nearly of the same type and found under similar circumstances, that is to say, in the gravels, sands, brickearths, and fine silt or loess deposited by rivers which have either ceased to run, or which ran at levels higher than their present ones and were only beginning to excavate their present valleys." The italics in this quotation are

mine.

The remarkable facts above referred to would be remarkable only if these things had really been the work of scanty savage tribes, separated widely over the face of the earth. Then different types might have been looked for. But the uniformity of type is not remarkable seeing that wherever these flints have been found *in situ* they have been produced by one natural process—fracture by percussion. And that “wherever”—“that is to say, in the gravels, sands, brick-earths,” etc., is not remarkable, seeing that they are only at home there, and at home only there, being the children “split away” from the gravel-stones or flints. Nearly all the material of all these valley and bank formations was originally broken or washed from the rocks, and rounded and pounded, and spread out, by ocean waves—and then the splitting was already done—before the drift was gently sorted into gravel, palæolithic implements, sand, and brick-earths; which assortment was generally done by the flow of great continental rivers, which flowed through these isles, some of them, before the foundations of the English and Irish Channels sank, let those waters into their ditches, and isolated us.

Is it not surprising that all these facts called “remarkable” should not have shewn the philosophers that they must look elsewhere for the origin of these inexhaustible flint-flakes, than to the scanty and limited tribes of the earliest hunters, who used some of them—a few of them—to tip their arrows? Besides, had these flint-flakes, which are simply countless in the gravels, been the work of the scanty and limited tribes of the earliest men, and then been left there in the quarries, instead of being bartered away where they were most wanted, far away from the quarries, what fools the palæolithic men must have been! These flakes were of great value as arrow-tips in districts not favoured with gravels, and would never be shaped by man to be thrown down at his feet and left behind in the quarry in their thousands. To suppose that these flakes are what primitive man *has* used, and shot away, and lost, and that they have been gathered from the general face of the earth by the rivers, and got together again in their original mother-beds, is, I trust, too absurd an idea to be advanced.

No doubt the early hunters who discovered these natural flint-flakes, collected some of them, and bartered them away in districts

where there were none to collect ; and after that some of them got chipped into better shape, until the neolithic period found them works of rude, and even civilized art. But the flakes which we now find in the gravels, are the work of Nature, and have never been touched by the hand of man, until we touch them, and bring them forth, and make false witnesses of them.

Of course it is possible that a real hand-made stone implement might be found lying about here and there in the valley of the Somme, or anywhere else. So might a gold watch, a diamond ring, or a pearl scarf-pin. It is not of such exceptional finds that we are speaking ; and they could not be made to prove the immense antiquity of man, any more than these flakes found *in situ*.

My collection of implements bears witness that these flint-flakes of the gravels were used by the ancients just as they took them from the gravel beds ; for dear Llewellynn Jewitt's hands gathered them from the grave-mounds. And many of them are white, from having been calcined at the cremation of the Ancient Briton who had owned them. It also bears witness that others at some time received slight touches of chipping from the human hand ; but none such are found *in situ* in the gravels, but only accidentally, as the gold watch might be found. It also shews progress from rudeness to beautiful early art.

When I wrote in the Jewitt volume about Llewellynn Jewitt's flints, I believe I referred to them all as having had some shaping from the human hand. I had not then closely examined the rudest of the palæolithic, and only spoke of them as I had been told. Since then I have fully examined, and assorted them. The proof that the gravel-flakes needed no hand of man to produce them, and then foolishly leave them there among the gravel, is that if nodules of flint be thrown together with such force as to shiver them, some of these flakes will be found among the splinters. And what is more, neither the ancient nor modern man could or can produce these special *rude* types by any other means than *mere* percussion ; unless by the laborious art of the lapidary. There is no chipping about them, except the chipping that wave action would give them on a sea-beach, such action operating only a short time and then suddenly ceasing.

The argument that because pieces of pottery have been brought up by borings in the Nile Valley from such a depth as to indicate

their deposition there thirteen thousand to eighteen thousand years ago, allowing an average accumulation of soil of three inches and a half in a century, is worthless ; when the average accumulation four thousand and five thousand years ago may have been eight or even twelve inches in a century. The results of borings in any river valley are not data for such calculations. There may be subsidences like the Cheshire meres, and many a Cheshire hollow besides ; and seismic disturbances ; and even floods without seismic disturbances, may remove old strata and re-deposit the same material in those hollows suddenly, and bring recent things there ; even side by side with archaic things in the re-deposition ; and the apparent anachronism renders them false witnesses to the credulous.

I have a tobacco pipe which was dug up about 10 feet below the surface of the ground during the construction of the Railway from Puerto Cabello to Valencia, Venezuela. It was presented to me by a friend who brought it thence. The same calculation of the average rate of the Nile Valley deposit above the fragments of pottery found there, would make the grave of this pipe, or rather the date of the pipe's interment, thirty centuries ago ; when it *may be* the thirty centuries, but, just as likely, only half a century.

There is another circumstance which ought to have prevented the faith of archaeologists in the ever-abundant so-called palaeolithic flints. The palaeolithic men, it is reasonable to assume, must have been much fewer than their so very much later descendants the neolithic, so very much later as it is contended. And it is also reasonable to assume that the flint works of the former, if they made them so very long ago, had a much greater chance of getting lost to us during the progress of the changes of the earth's surface in the 50,000 years which it is claimed must have intervened. Consequently the palaeolithic flint vestiges should be much fewer than the neolithic, with the fewer people to require them and make them in the first instance, and the longer time—nearly 50,000 years—to lose them in the second instance ; much fewer than the neolithic flint vestiges with so many more people to require them and make them in the first instance, and the so much shorter time—about 7,000 years—and the so much calmer time in which to preserve them, in the second instance. And yet how astonished archaeologists would be if they could find among the gravels, or find anywhere, the thousands of

beautiful neolithic flints in place of far less likely palæolithic flints ! Tom Tiddler's ground, where you may pick up gold and silver, would be of no account compared to this neolithic ground, all strewn with beautiful flint arrow and spear-heads. Such a field, with two or three hundred archæologists in it, would become a field of strife.

There is not an argument in this chapter on the "Antiquity of Man" to prove the antiquity attempted of 50,000 years, any more than of 6,000 or 7,000 years. Not that it matters.

LETTER XXXIII.

MORE ON THE LAW OF EVOLUTION.—ON THE ADAPTATION OF THE EYE TO THE HABITAT OF LIFE.—ON DOGS, WITH A BEAUTIFUL SKETCH OF THEM BY MR. LAING.—THOMAS COOPER THE POET AND CHARTIST.—ON LANGUAGES AND THEIR CHANGES.—THE CAPACITIES OF THE NEGRO.—THE FUTURE OF THE AMERICAN NEGRO.

17 MAY, 1892.

UR next chapter is entitled "Man's Place in Nature," and in it the origin of Man seems to be still regarded as something very simple and easy to understand in its self-action, when it must ever remain a mystery to the human mind in its present limited brain-residence. On page 166 Mr. Laing says :

"Until recently it was taken for granted that man was a special miraculous creation, altogether superior to and distinct from the rest of the animal world. This assumption, gratifying alike to our vanity and our laziness in the laborious search for truth, has been to a great extent disproved and replaced by the Law of Evolution."

I think man really is superior to the rest of the animal world ; and have already shewn myself too dull to account for that superiority by any mere "Law of Evolution." I readily, however, recognize a Law of Progress to the fullest development of species : beyond that I seem to see the need of some other Law of Divine Creation in fulfilment or furtherance of a Divine Plan. The protoplasm in its nucleated cell is again mentioned as if something easily understood in its progress of self-action, thus :

"This nucleated cell is itself the first form into which a mass of simple protoplasm is differentiated in the course of its evolution from its original uniform composition. The nucleated cell is the starting-point of all higher life, and by splitting up and multiplying repetitions of itself in geometrical progression, provides the cell material out of which all the complicated structures of living things are built up."

After reading this I feel no abatement of wonder at the inexplicable mystery of the creation of man out of such a beginning ; for I am given no insight into the marvellous mystery. It seems to me that it would not have been a bit more wonderful if the genie's error about the stones and bricks of the palaces, temples, tombs, monuments, and places had been no error but perfect truth ; and the stones of which St. Paul's Cathedral is built had themselves started with one stone which "by splitting up and multiplying repetitions of itself in geometrical progression, provides the [brick or stone] material out of which all the complicated structures are built up." The one thing seems to me quite as easy to conceive and understand as the other ; and, seeing that the genie could be made to believe in the self-action of the cells, I don't wonder at his credulity about the self-action of the bricks and stones. Here is the thing again, still "splitting up and multiplying repetitions of itself" and "providing cell material" : but how does it do it ? Well, it is the mode of operation of the Creator of man, a miraculous mystery ; and that is all we can answer. We cannot understand it, pretend how we may. But we can, and it is part of our nature to, adore the awful Power Wisdom and Goodness thus displayed, and be grateful for the beneficent operation and the results of the mystery throughout animated nature. It is as though we were looking on at the building of some beautiful structure by an invisible builder—an invisible Genie of the Lamp. We only see the work progressing, but the builder is there at work unseen. But in God's omnipresence at His building we feel that the simile of a mere invisible Genie of the Lamp fails, and the incomprehensible mystery remains. A good deal has been said about the eye diminishing when the habitat of life has been changed from daylight and moonlight to general partial darkness ; as though it must be a triumphant instance of independent self-action on the part of the eye, in gradually reducing itself when its services are less

needed, and even committing suicide outright in course of time when not needed at all. Mr. Laing refers to this well-worn subject on page 170. It seems to me so curious to make it an argument against the Power Wisdom and Goodness of God, that animals whose habitat is in the bright daylight have eyes adapted to see that which the light reveals, and others, whose habitat is comparative darkness, have those organs very faintly, but quite sufficiently developed ; such as the mole, and fishes in the dark Mammoth Cave of Kentucky, and the underground lakes of Carinthia. These adaptations of sight to the condition and need of the seer appear to me, on the contrary, convincing proofs of the Power Wisdom and Goodness of God, whether He bring about the adaptation slowly or quickly in our estimation. There seems to me as much Divine Power and Wisdom put forth in altering an existing model to adapt it to new circumstances, as in making a new model so adapted, the Adapter being Himself the Maker of the original model. And it becomes the same thing however gradually it may be done ; even if a minnow be altered to a man ! I should say the Creator must know best how to go about His work in creating the living creatures out of compounds of diamond, iron, calcium, magnesium, potassium, sodium, phosphorus, sulphur, and all the rest. It seems reasonable to conclude that these various materials cannot of themselves unite and arrange themselves into living animals ; and if they come together in the wondrous living structures, as we find them, by some Law, it is by the law of God—regulating everywhere ! And why deny, as old folly and ignorance, that this law is the Power Wisdom and Goodness of God, everywhere manifested in the Creation ; and that all His works are miracles to us, whether they be quick miracles, or slow in our estimation ?

This reminds me again of good Sir Charles Bell and "The Hand." I have been thinking that the so-called Agnostic anatomist's denial of God and of Design in the Creation, because of the Agnostic's recent "more complete knowledge" of some of the mechanism of creation—especially in regard to the protoplasmic cells of life and their energy—and his contempt for such mistaken godly anatomists as Sir Charles Bell, is like some one, previously unversed in mechanics, happening to be employed to assist in taking to pieces some wonderful machine of whose structure he was perfectly ignorant. Let us say an Orchestrion, or *the* Orchestrion, the first one ever made,

to whose music this man had listened with joy and wonder, and revered its inventor and maker as a divine genius. But at length, in helping to take the thing to pieces, he discovers the secrets of its construction, and turns round to the erst revered inventor and maker and says : "I say ; look here ; this is all a swindle. I thought *you* had been the cause of all these tunes ; but it is not *you* ; it is these pipes and things, and an energy within among them which belongs only to the machine itself. You have nothing to do with it, whatever you may have had to do with it at one time." You see this is all the result of the "more complete knowledge" recently obtained by the Agnostic. But, in fact, if this abused inventor and maker of orchestrions be employed all his time in turning out new orchestrions, then he might be truly said to have a good deal to do with them ; however independent of himself he made them to be, for a while, when completed. And thus in Nature God is ever carrying on continuous creation in replacing the wear and tear of the old, if such an expression be applicable to Nature's Progress.

I think Mr. Laing's remarks on the Dog, on pages 173-4 are very beautiful and true. Is not this pretty and charming ?

"Those who are fond of dogs, and have lived much with them and understood their ways, must have been struck with the many human-like qualities they possess, and especially by the very great resemblance between young dogs and young children. They both like and dislike very much the same people and the same mode of treatment. They like those who take notice of them, caress them, talk to them, and, above all, those whom they can approach with perfect confidence of receiving uniform kind treatment. They dislike those who have no sympathy with them, or whose treatment of them is either cold or capricious. Their great delight is to play with one another, and often to tease and make a pretence of quarrelling and fighting. They both have an instinct for mischief, and are constantly trying it on how far they can go without getting into serious difficulties.

"Later in life, and in more serious matters, the dog has certainly the germs of intelligence, and does a number of things which require a certain exercise of reasoning power. He has a good memory, and imagination enough to be excited at the prospect of a walk where there is a chance of finding a rat or rabbit, and to dream of chasing

imaginary rabbits when he is lying curled up on the hearthrug. Every dog has an individual character of his own as clearly defined as that of an individual man, nor can the rudiments of consciousness be denied to the hound who, in a kennel of twenty others, knows perfectly well that he is Rover, and not Rattler or Ranger, and waits till his name is called to come forward for a biscuit. When he has got it, his sense of property makes him appropriate it as his own, and respect the biscuits appropriated to other dogs, at any rate to the extent of knowing perfectly well that he is doing wrong if he takes them by force or steals them.

"In moral qualities the dog approaches even more closely to man. His fidelity, affection, and devotion even to death, are proverbial. He feels shame and remorse when he has departed from the canine sense of right and wrong, or from the canine standard of honour, and is happy when he feels that he has done his duty. What is this but the working of an elementary conscience? Even in the higher sphere of religious feeling, the dog feels unbounded love and reverence for the master who is the highest being conceivable to him, or in other words, his God; and he shudders as that master does in the presence of anything weird and supernatural. Every good ghost story begins by describing how the dogs howled and shrank to their master's feet when the first shadow of supernatural presence was cast on the haunted castle."

It is a curious circumstance that while the dog exhibits unbounded love and reverence for his master—not, perhaps, as his God, but as his dear friend whom he can occasionally assist and defend, he no sooner sees his master's unknown brother or cousin running past the door than he is up and after him with a growl and a sort of a "stop thief!" bark; conceiving that a man or boy who runs away must have done something wrong, and should be run after with sounds of dog reprobation and threat of capture. He evidently does not regard mankind as Gods, for he tears the godlike trespasser and thief. He rather assumes the function of police-constable among the human gods, than a demeanour of general reverence for them; and those whom he most adores he considers it his duty and office to assist and protect, with, as Mr. Laing says, "devotion even to death." Even a very small spitfire naturally cherishes this notion; and does not hesitate, in his sense of this duty, to demonstrate against a

mighty offending god. But how beautiful is this description of man's dear and faithful friend. It seems to me that the dog's life, on the whole, is the happiest life of any inferior creature associated with man ; for he himself is the general dread and torment of the otherwise happy cat. He is, at least in England, exempt from slavery, and, unlike the poor horse-slave, escapes the whip spur and harness. Yet he sometimes suffers chains too cruelly. Yes ; and how often he, so loving, suffers from unrequited and unaccepted love. I always feel keenly for poor homeless masterless dogs—out of place from no fault whatever of their own ; and have been distressed in walking through a town in the small hours of a winter night to see the numbers of poor unowned affectionate faithful creatures moving miserably about ; or crouching in doorways which are no doorways of theirs. I have had several following me at once, visible in the moonlight, having discovered my compassion by mere sniffing ; begging for a situation when I had none to offer them. I remember one night being followed in this way through Newcastle-under-Lyme, and in spite of my driving them back, and so losing their company one by one, still one of them kept me in sight until I reached my door at Stoke, and then stood at my heels unperceived in the dark, and as soon as I had unlocked the door he slipped in before me, determined to be engaged as my faithful servant and friend. And my heart was really not hard when I invited him to go out into the dark again and recommended him to return to old Newcastle ; for I was deeply grieved, and remember him with sorrow to this day. How very much such a dog must feel like singing the old song “O that I had some one to love me !” only that he feels too sad and heart-broken to sing anything, and he moans it instead, poor dear dog, in his doggish way. Still I believe that the dog, in a general way, is among the happiest of man's subjects, police-constable among men though he claims to be. But he has his sorrows.

Yes, Mr. Laing has written very prettily about the dear dogs, and I am sure he is a great favourite with them. They have only to sniff at him to find that he is their friend. And he is indeed on all subjects a most able and eloquent writer. But he has been so fearfully misled by his science-captains in whom he has put his trust. Besides the true good bricks which compose his structure, he has accepted from them bricks of butter dipped in sand, the water of

which is frozen, or "crystallized into fact." And when the light and heat of the spring-time of truth shall act upon them, what will become of his edifice? The apparent crystallized facts will melt away. I say bricks of butter dipped in sand, because butter is a good and valuable thing, and these bricks represent good and valuable intellect wasted, and falsely applied, and shammed over with sand of plausibility to deceive. But not of his doing.

It is my belief that the author of "Modern Science and Modern Thought" will yet some day reverse engine, and employ his splendid talents, his God-given abilities, although at present, in a manner, God-denying, to prove, which he will find so much easier, and shew forth, "The Power Wisdom and Goodness of God as Manifested in the Creation."

"King Agrippa, believest thou the prophets?"

"Then Agrippa said unto Paul, Almost thou persuadest me to be a Christian."

It was so with Thomas Cooper. I mean that Thomas Cooper who while in gaol for his chartist violences wrote a book entitled, I think, "The Purgatory of Suicides." He was a rabid yet clever-reasoning anti-Christian; and spent the earlier part of his life in writing and lecturing against Christianity; and convinced himself and many others that Christianity was all human gullibility, trickery, and falsity. At last the scales fell from his eyes; and then he set to work to write and lecture on the Evidences of the Truth of Christianity. He stopped at this Stoke house two or three days many years ago when he came here to lecture; and it was wonderful how much more eloquent and convincing he became in advocating Christianity than in denouncing it.

But let us return to our chapter, in which the author gives a very erudite discourse on languages; with the object of shewing that the existing human languages must have been immense periods in forming, and exhibit several distinct origins. I think this is another butter-brick of the edifice. Mr. Laing finds an argument in the great differences of grammars. We must remember that the grammars are the *results* of the changes of language in separated nations. A language was not formed by its grammar. Its grammar is its analysis, not its synthesis. And a language without a literature, used by cousin tribes who some day diverge from a centre and never meet again, will

in time become as many languages as there are divergent tribes. Nothing in human affairs is more sure to change than a language without a literature ; and, of course, the changes will be different with each of the divergent tribes. And even with a literature the fashion of pronunciation goes on varying. Look for example at the present-day variety of pronunciation of the original Latin—the Latin dialects as we may call them now, of the continental nations who have even continued near neighbours during the process of change. Egyptian hieroglyphics 5,000 years old do not enable us to compare the language—the pronunciation—of that period and say that it is the same as the modern Coptic. Without a literature—and the development of language came first—there is a natural tendency in general speakers, I mean ordinary talkers, not orators, to contract a language by dropping some articulations, or jumbling words together, and also consonants, for ease and smoothness of speech. This goes on at the same time that new words become adopted to express new thoughts. And by these processes alone an original language *must* gradually change and become unrecognizable among the divergent tribes.

When I came from London to Staffordshire about thirty-seven years ago I could not understand the old dialect of the old natives, and had as much need of an interpreter as if I had been in a foreign land. Schools and railways are altering all this now. I remember hearing one boy say to another :

“Ile githay slap chops !”

“Grout ; thay wunner !” was the reply.

This, translated politely into my London tongue was “I will give you a slap on the face !” And the reply meant “Get out ; you will not !” Suppose London had no literature and no quakers, and no “thee” nor “thou” left in *memory* ; the difference in the dialects would be considerable already, and we may imagine that the same changes going on, with no intercourse whatever during another thousand years, would result in two very different grammars of analysis if they were at the end of that time started. The first boy meant just what he said and nothing else. He did not mean the London words, and would not have understood them ; but his meaning was just the same and as amply conveyed to his adversary. Even lately an instance of this contraction and change of sounds reached me in a country lane. Two cyclists, had paused, on their opposite ways, to

gossip ; and one was telling the other that some mutual acquaintance no longer stopped at a certain house ; and the other uttered the sound "Wizzygoo," as an enquiry "Where does he go ? "

Here is another instance which I think I noted from "Punch" some time ago. A smoker short of a match to light his pipe approaches a group of comrades and says to one :

"An yer onny matches on yer Mate ? "

"No ; I anner." Then addressing the group the first speaker says, referring to the desiderated match : "An onny onyer onny onyer." But really here there are four articulations which were not in his actual utterance ; or, at least, never have been when I have heard that language spoken, and it has been one long unbroken word thus : "Anonnyonyeronnyonyer." And this is always understood perfectly by those who use this dialect as signifying "Have any of you any upon you ?" This should shew how easy it must have been to derive from one original language all that now exist upon the earth, with as many communities isolated for a few thousand years each, and without literatures.

And the potentiality to acquire with rapidity, copious language and expanded thought in the lower races of mankind, and therefore without the aid of the heredity of high culture, is greater than many writers imagine ; and it was therefore presumably the same in the earlier days of mankind. It has been thought that the native African negro mind would be very difficult and slow to develop. But an incident occurred here last week to prove the contrary. Last Tuesday morning I was told that two negro ladies wished to call at my house and Works in the afternoon. Being a recluse I was unwilling to see the negro ladies. But they came and I was charmed. They were accompanied by two of my friends ; and the open carriage as it drove up to my door, was a picture. They are the daughters of a very wealthy negro, and their costumes were very elegant ; with the usual brightness of plumage arranged in excellent taste. One was a perfect Topsy in person, but when I joined them in the Drawing-room, later on, having changed my mind, I found them to be perfect ladies in every respect. Fancy a Topsy in person, with the deportment of the highest-bred English or French lady, speaking the most refined English without a fault ; and quick in the apprehension of anything which the language can describe or express ; singing and playing

sweetly and faultlessly so that an educated English young lady might envy the sweetness and faultlessness. And their appreciation of the works of art with which they found themselves surrounded here, was that of connoisseurs. In their own country they are great people, I am told, and they have been educated, without regard to cost, in England, France, and Germany. But they are of the same race as the American negro slaves. So in the long past days of our fore-fathers rapid advances may have been made in civilization under the leadership of pioneering geniuses ; for the potentiality was evidently born in the races, independently of heredity, although the education may be more difficult without the heredity. I am not sure of that.

It is my belief that this potentiality of the negro mind, and his physical adaptability and adaptedness to the new habitat which was cruelly forced upon his fathers, as the land of their bondage, will result in a great and quick fresh human development, and ultimately in a tremendous disturbance of racial balance in the New World. Even the Children of Israel when *they* were delivered from slavery, were found to be unfitted immediately to conquer their promised inheritance, and settle down to the full enjoyment and exercise of their franchise ; and they had to wait for a new generation of freemen to be born and reared in the free wilderness, and there drilled in the habits and duties of citizenship, before they were fit to take possession of their destined land. With the negro it may take *two* generations, as he still lives in the atmosphere of his old bondage, instead of the fresh free wilderness. But it is my belief that in time he will grow revengeful against the children of his old masters, and resentful of the contempt of the children of his deliverers, and will ultimately claim and seize a part of the New World for an Empire of his own ; and may prove a formidable neighbour ; and turn the tables upon the race of his old masters. I believe that Providence controls all things and turns all events to ultimate right and good ; and this may possibly be the Providential outcome of the cruel wrongs done to the African when he was torn from his home, dark as that home was, and sold into slavery in regions of light—all his blood and bone and sinew and brain—for money.

LETTER XXXIV

RELIGION.—THE MAN-FORM GODS.—THE BIRTH AND EARLY LIFE OF BUDDHA.—HIS DIVINE SYMPATHY WITH SUFFERING MANKIND.—HIS GREAT RENUNCIATION OF THE WORLD AND ITS KINGSHIP THAT HE MIGHT SAVE MANKIND.—BUDDHA REMARKABLY LIKE CHRIST.—SIR EDWIN ARNOLD AND “THE LIGHT OF ASIA.”—BUDDHA’S FAREWELL TO HIS WIFE YASODHARA.

29 MAY, 1892.

HE argument of this sixth chapter passes from implements and languages to religion, and further endeavours to prove, from the supposed necessarily slow development of the latter, the great antiquity of man. But I see no force in any of the arguments. You made reference, in a letter the other day, to Buddha, and to the Absorption theory of Brahmanism. Our author in this chapter makes a brief reference to Buddha in speaking of the anthropomorphic, or man-form gods, among whom he includes the Hebrew Jehovah as well as the Grecian Jove and Indian Buddha. He says of the latter :

“ And even the introduction of Buddhism has done little but add the deified hero, Buddha, to the list of divine ancestors and give more definite shape to various vague superstitions. In like manner the whole Buddhist world can hardly be said to recognise anything beyond their incarnate hero, except a Nirvana or metaphysical abstraction, rather than a personal deity.” Let us make this an excuse to have a talk about Buddha the Compassionate, of whom I love to think and speak, and whose graven images I cherish with the affection of a Cingalese.

Buddha, you know, is Sanscrit for The Enlightened, also The Wise, or of Superior Intelligence. The Prince so-called was also known as Sakya-muni, or the Sage of the Sakya tribe, of which tribe his father, Suddhodana Gautama, was Rajah or King. These are both titles which the Prince acquired in after life, and did not belong to him as a child ; although I see Sir Edwin Arnold styles him Lord Buddha in his childhood. His own name was Siddartha Gautama, which some spell Gotama. Some writers have left it on record that he was born 1000 years B.C., but the Cingalese account is considered

the most reliable and that gives the date of his birth as 624 B.C., at Kapilavastu on the borders of Nepaul. The teachings of Gautama have been very much misunderstood and misrepresented in our literature until recent years ; and old books will tell you that the Nirvana or final Heaven of Buddhism is complete annihilation ; an idea more horrible to the human mind than the Absorption of Brahmanism ; and by no means likely to have become the dear faith of more than a third of the human race, lasting, with increasing hold, during more than 2,500 years thus far at the very lowest computation and about 3,900 years, speaking from memory, at the highest.

Before the birth of Siddartha, we are told, it was prophesied that he would be a holy and wondrous child and man ; with the option of either saving all mankind by his own self-sacrifice, or of ruling the whole world as the greatest of earthly kings—the King of kings. And at the tidings of his birth men came from afar with offerings of all sorts of precious things, and their own homage, to the infant. And also there came an aged saintly prophet who had heard the Devas, or gods, singing songs of joy at the birth of the divine child. This aged prophet had wished to die, but now he rejoiced that he had lived to see this babe, who was to preach the Law and bring salvation to all mankind. His mother, Maya, is said to have been worshipped by the invisible Devas of the earth, and afterwards by the Devas of Heaven, as the Mother of the Lord. As the child grew up great care was taken by the King his father to keep from him all knowledge of evil ; and when the time came for his scholastic education, and the most eminent doctors were appointed to instruct him, it was found that on all subjects he was already, at eight years of age, far more knowing than they. The King was anxious that his son should choose the pomp and glory of the Kingdom of all the earth, and reign as King of kings, rather than avoid a throne to devote himself to the instruction and salvation of mankind ; and when the Prince was eighteen years old his father had already prepared for his residence an enclosed Paradise in which were three magnificent palaces adapted to the varying seasons. And all conceivable delights were brought together in that Paradise. And the most beautiful and exquisite singers and dancers were resident there ; as well as all the most charming animal and floral life of India. In fact it was the Paradise of India. And from it were excluded all unsightliness, all visible sign of decay, or

sorrow, or pain, or old age. And in the course of time this Paradise was shared by the Prince's most lovely, loving, and dearly beloved wife, Yasodhara. Then his happiness was complete and for some years his life was spent joyously with his darling Yasodhara. Joyously because in his Paradise he never saw, nor heard of, anything to arouse the compassion and sorrowful sympathy of his great divinely compassionate and sympathetic heart. But at length he was seized with a fervent desire to visit the city beyond the confines of his Paradise, that he might see something of the life and habits of his future subjects. The King consented, but took precautions to have the route of his progress furbished up, and issued a proclamation that on the day of the visit of the Prince no thing nor person should be seen abroad that would make him acquainted with unsightliness, or sign of decay, or sorrow, or pain, or old age, or death. But by some mischance, as it then appeared, when the Prince had been driven through much that was pleasant to behold, and had been received with rapturous welcome by the citizens, there suddenly appeared before him a withered decrepit old man, most wretched, begging alms. The sight astonished and grieved the Prince, and he enquired of Channa his charioteer, how this man came to be in so pitiable a condition. To which he replied that this was merely an example of old age and decay among the poor; and that the old age and its weakness and decay were the lot of all mortals whose lives were sufficiently prolonged.

"Then if I and the Princess Yasodhara live to the age of this old man shall we also become likewise decrepit?"

"Yes, great Prince."

"Then turn back to my Court. What have I to do with pleasure who am destined to such an end?" And the Prince pondered sadly on what he had seen and heard, all painfully new to him; and shunned the singers, the dancers, and all the pleasures of his Paradise.

After this the Prince implored his father to allow him to go forth again among the people, but in disguise, without any preceding preparation for his visit, that he might see the real habits and life of the people—how they really lived who were not kings and princes; or how should he ever be able to rule them in the future? The King, after consideration, consented to this, trusting that the contrast of conditions would cause his son, after all, to appreciate all the more

the delights of his own Palaces and Paradise.

And so the Prince went forth again, disguised as a merchant, accompanied by his charioteer, but on foot. And they beheld, much interested, the various busy occupations of the citizens and the toils of man and beast. At length when they had wandered outside the city walls they heard from the road-side the moaning of one in pain. And they perceived a man lying on the ground in great agony, stricken with the plague. Him the Prince ran to, and raised tenderly, and tried to comfort, heedless of Channa's warning that the stranger was suffering from a dire contagious disease which was very infectious and might be caught by the Prince himself.

"Is this sickness a common occurrence, and might I indeed suffer the same?"

"Yes, great Prince; sickness and pain and sorrow are the heritage of mankind, and all, in turn, may expect to suffer some physical ills."

What became of the sick man is not, I believe, recorded. But it is recorded that on another occasion shortly after this, when the Prince and his attendant were again abroad, they met a funeral procession proceeding to the funeral pyre on the river-bank, the dead man on the bier exhibiting the thin famished ghastliness of death after sickness, and the relatives throwing dust upon their heads, beating themselves, and uttering piercing cries. Then said the Prince:

"Alas for youth, which old age destroys! alas for health, which sickness destroys! alas for life, which ends in death! Oh, that there were no old age; no sickness; no death. Let us go back. I will meditate how to accomplish deliverance."

And while he was meditating he beheld a mendicant of serene and dignified aspect, although poorly clad, and carrying in his hand an alms-bowl. In reply to the Prince's enquiry Channa explained that the serenity and dignity of this poor man were due to his self discipline, in renouncing all the pleasures of the world, and conquering himself, whereby he lives now without passion, without envy, and without desire.

"This," said the Prince, "is the way of escape. I also will renounce life and its pleasures."

And the Great Renunciation was faithfully accomplished by this rich and highly favoured Prince. It was not only the renunciation of his incomparable Paradise, his splendid palaces, his servants,

singers, and dancers, and his potential earthly Kingdom as King of kings. That was all easy to such a divine mind, so much greater was his divine humanity than all these things, that they were as nothing compared to his ardent compassion for the whole suffering human race. All these things were as nothing: but there was yet something which it was a great trial to his divine human nature to renounce—his dearly beloved Princess Yasodhara and his dearly beloved child. But one night he arose and gazed upon them, sleeping, for the last time; and with very bitter sorrow, and struggle against dear grievful love, he withdrew from his palace, calling upon Channa to saddle his horse. The heavy gates of his Paradise were closed and strongly guarded, but invisible Devas opened them, casting deep sleep upon the guards; and the Prince and his attendant rode forth.

Was not Siddartha a typical Christian centuries before the dawn of Christianity—or, rather, of the Christian era, in thus renouncing the Kingship of kingdoms, father and mother—had mother been living, dearly beloved wife and child—all, that he might seek to aid in the redemption of poor suffering mankind?

And all the night long the Prince and his attendant rode onward far from the city of Kapilavastu, until dawn, when Siddartha alighted from his horse, and completed his great renunciation of the world's pomps and pleasures, by stripping off his princely robes, his crest of pearls and other ornaments, his jewelled sword-belt and sword, cutting off his beautiful long hair with the latter; and all these things he handed to his faithful servant and confidential friend, Channa the charioteer, bidding him lead back his beautiful white stallion Kantaka, with all these things to his dear father, begging him not to grieve for his son's renunciation of princely rank and pleasures, but to forget him, until by self-conquest and lonely strivings and searchings for knowledge and light to work out the salvation of all wretched beings, he should become ten times more a Prince than now, and the conqueror of the earth by love, having merely given up the world that he might save it, instead of clinging to it that he might accomplish his potential worldly Kingship, ordained to his choice by the Gods—the worldly crown, easily to be won by the sword, with the aid of the Gods, on fields of blood.

And this renunciation of the worldly world, was also the renunciation of religion—Brahmanism. He found it, as fashionably practised,

to be a hollow sham. He did not believe in the Hindu Trinity. He saw in the Brahmanical ritual chiefly a scheme for the enrichment and ascendancy of the priests. He renounced all, that he might, untrammelled, seek the as yet undiscovered Truth or Law. It appeared to him that the greater the renunciation and self-sacrifice the greater would be the power of search and strife, and the greater the chance of attaining to this Light or Buddhahood. In the sweet and sublime words of Sir Edwin Arnold the Prince had said to his wife last evening :

“‘ Comfort thee, dear ! ’ he said ‘ if comfort lives
 In changeless love ! for though thy dreams may be
 Shadows of things to come, and though the gods
 Are shaken in their seats, and though the world
 Stands nigh, perchance, to know some way of help,
 Yet, whatsoever fall to thee and me,
 Be sure I loved and love Yasôdhara.
 Thou knowest how I muse these many moons,
 Seeking to save the sad earth I have seen ;
 And when the time comes, that which will be will.
 But if my soul yearns sore for souls unknown,
 And if I grieve for griefs which are not mine,
 Judge how my high-winged thoughts must hover here
 O’er all these lives that share and sweeten mine—
 So dear ! and thine the dearest, gentlest, best,
 And nearest. Ah, thou mother of my babe !
 When most my spirit wanders, raging round
 The lands and seas—as full of ruth for men
 As the far-flying dove is full of ruth
 For her twin nestlings—ever it has come
 Home with glad wing and passionate plumes to thee,
 Who art the sweetness of my kind best seen,
 The utmost of their good, the tenderest
 Of all their tenderness, mine most of all.
 Therefore whatever after this betide,
 Bethink thee of that lordly bull which lowed,
 That jewelled banner in thy dream which waved
 Its folds departing, and of this be sure,

Always I loved and always love thee well,
 And what I sought for all sought most for thee.
 But thou, take comfort ; and if sorrow falls,
 Take comfort still in deeming there may be
 A way to peace on earth by woes of ours ;
 And have with this embrace what faithful love
 Can think of thanks or frame for benison—
 Too little, seeing love's strong self is weak—
 Yet kiss me on the mouth, and drink these words
 From heart to heart therewith, that thou mayest know—
 What others will not—that I loved thee most
 Because I loved so well all living souls.
 Now, Princess ! rest ; for I will rise and watch.’”

And while with tears in her eyes the Princess slept, and her husband watched, he seemed to hear the words : “The time is come !” And the old prophecy became as clear words in his mind ; and he felt that this was the night on which he must decide, and choose between worldly greatness and humble goodness ; to reign as King of kings, or wander lonely, not only crownless but homeless, to seek and discover the Truth, or Law, which should for ever help the world. And he says :

“ ‘I will not have that crown
 Which may be mine : I lay aside those realms
 Which wait the gleaming of my naked sword :
 My chariot shall not roll with bloody wheels
 From victory to victory, till earth
 Wears the red record of my name. I choose
 To tread its paths with patient, stainless feet,
 Making its dust my bed, its loneliest wastes
 My dwelling, and its meanest things my mates ;
 Clad in no prouder garb than outcasts wear,
 Fed with no meats save what the charitable
 Give of their will, sheltered by no more pomp
 Than the dim cave lends or the jingle-bush.
 This will I do because the woful cry
 Of life and all flesh living cometh up
 Into my ears, and all my soul is full

Of pity for the sickness of this world ;
Which I will heal, if healing may be found
By uttermost renouncing and strong strife.'

“ ‘ What good gift have my brothers, but it came
From search and strife and loving sacrifice ?
If one, then, being great and fortunate,
Rich, dowered with health and ease, from birth designed
To Rule—if he would rule—a King of kings ;
If one, not tired with life’s long day but glad
I’ the freshness of its morning, one not cloyed
With love’s delicious feasts, but hungry still ;
If one not worn and wrinkled, sadly sage,
But joyous in the glory and the grace
That mix with evils here, and free to choose
Earth’s loveliest at his will : one even as I,
Who ache not, lack not, grieve not, save with griefs
Which are not mine, except as I am man ;—
If such a one, having so much to give,
Gave all, laying it down for the love of men,
And therefore spent himself to search for truth,
Wringing the secret of deliverance forth,
Whether it lurk in hells or hide in heavens,
Or hover, unrevealed, nigh unto all :
Surely at last, far off, sometime, somewhere,
The veil would lift for his deep-searching eyes,
The road would open for his painful feet,
That should be won for which he lost the world,
And Death might find him conqueror of death.
This will I do, who have a realm to lose,
Because I love my realm, because my heart
Beats with each throb of all the hearts that ache,
Known and unknown, these are mine and those
Which shall be mine, a thousand million more
Saved by this sacrifice I offer now.
Oh, summoning stars ! I come ! Oh mournful earth !
For thee and thine I lay aside my youth,
My throne, my joys, my golden days, my nights,

My happy palace—and thine arms, sweet Queen !
Harder to put aside than all the rest !’

“So with his brow he touched her feet, and bent
The farewell of fond eyes, unutterable,
Upon her sleeping face, still wet with tears ;
And thrice around the bed in reverence,
As though it were an altar, softly stepped
With clasped hands laid upon his beating heart,
'For never,' spake he, 'lie I there again !'
And thrice he made to go, but thrice came back,
So strong her beauty was, so large his love.”

Then the Prince went forth in the dark on his beautiful white stallion Kantaka accompanied by his servant-friend Channa. And at the dawn of day he completed his great renunciation as we have already seen.

If you please we will continue our talk about this great divine Prince in my next letter.

LETTER XXXV

BUDDHA'S RETIREMENT AND SELF-DENIAL.—HE REFUSES THE OFFER OF HIS FATHER'S KINGDOM.—HE DECLARES THAT HE IS SEARCHING FOR JOYS THAT ENDURE.—NO ANNIHILATION IN TRUE BUDDHISM—BUDDHA'S INTENSE COMPASSION.—THE FOUR SUBLIME TRUTHS OF BUDDHISM.—ITS FINAL REDEMPTION AND NIRVANA OR HEAVEN.

5 JUNE, 1892.

NOU will remember that when Prince Siddartha effected his Renunciation of the worldly world he was twenty-nine years old ; and for six years after that he meditated in solitude with frequent fasting, striving to discover the Law of salvation for all suffering creatures ; with a cavern for his retreat, the jungle for his walks abroad, and mountains for his horizon ; seeking the complete conquest of self by self-denial : in

solitude, except that in course of time he was attended by five disciples, fellow ascetics, who had recognised the divinity of his character. While thus living, his loving father, having discovered his retreat, sent to him imploring him to return to his palaces, and receive at once his father's crown and kingdom.

"Dear Son," he said, "the practice of religion involves as a first principle a loving compassionate heart for all creatures ; and for this reason the very name of a religious life is given to it. Why, then, should you consider a religious life as a term applied only to those who dwell in the lonely mountains ? In former days men lived at home and practised religion. They did not then cast away their jewels, or shave their crowns, and yet they were able to attain to complete emancipation." Among the sentences of the Prince's reply was this one : "I have given up all fancied joys, and I am searching for joys that endure." *This does not sound like seeking annihilation.* Again, when objecting to the interminable transmigration theory of the Brahmans of his time ; which theory preceded that of final absorption into Brahma ; he said "I search for that which is imperishable and permanent." His mind abhorred "an existence in which everything was subject to the ceaseless rotation of decay, death, birth ; decay, death, birth." His word "imperishable" implies no annihilation. We may, perhaps, return to this great question again and again, to shew that Buddha, the founder of a faith professed at this moment by more than a third of the entire human race, did not preach annihilation as the end and reward of the fulfilment of his law. What he discovered and took his titles from was LIGHT, which implies Consciousness, and not Annihilation, which is darkness and death. Had Buddha's doctrine really been that the fulfilment of his law led not only to the impossibility of re-birth, but to the certainty of annihilation, mankind would have avoided his law ; or, rather, would purposely have disobeyed it, to secure the re-birth and its chances, in preference to final utter destruction. In fact Prince Siddartha, before he attained the Buddhahood, appears to have accounted life very precious, even that of goats and sheep, although willing to give up his own life to save others and free them from sorrow and pain.

The divine author of "The Light of Asia" exhibits this compassion very sweetly in a tableau in his Fifth Book. The hermit

Siddartha has wandered from his jungle to the neighbourhood of a town not far off, and observes a flock of goats and sheep pouring down a hill-side winding path, driven by peasants. The animals give some trouble to them by stopping to nibble at tufts, and darting aside to puddles of water as it is thirsty noon ; and—

“A ewe with couplets in the flock there was,
 Some hurt had lamed one lamb, which toiled behind
 Bleeding, while in the front its fellow skipped,
 And the vexed dam hither and thither ran,
 Fearful to lose this little one or that ;
 Which when our Lord did mark, full tenderly
 He took the limping lamb upon his neck,
 Saying, ‘ Poor woolly mother, be at peace !
 Whither thou goest I will bear thy care ;
 ’Twere all as good to ease one beast of grief
 As sit and watch the sorrows of the world
 In yonder caverns with the priests who pray.’”

Then the prince enquired of the peasants why they were driving the flocks down at noon instead of evening ; and they replied that they had been sent to fetch a sacrifice of a hundred sheep and a hundred goats which the king would slay to-night in the worship of his gods :

“Then said the Master : ‘ I will also go ! ’
 So paced he patiently, bearing the lamb
 Beside the herdsmen in the dust and sun,
 The wistful ewe low bleating at his feet.”

“So entered they the city side by side,
 The herdsmen and the Prince, what time the sun
 Gilded slow Sona’s distant stream, and threw
 Long shadows down the street and thro’ the gate
 Where the King’s men kept watch. But when these saw
 Our Lord bearing the lamb, the guards stood back,
 The market people drew their wains aside,
 In the bazaar buyers and sellers stayed
 The war of tongues to gaze on that mild face ;

The smith with hammer lifted in his hand,
 Forgot to strike ; the weaver left his web,
 The scribe his scroll, the money-changer lost
 His count of cowries ; from the unwatched rice
 Shiva's white bull fed free ; the wasted milk
 Ran o'er the lota while the milkers watched
 The passage of our Lord moving so meek,
 With yet so beautiful a majesty.
 But most the women gathering in the doors
 Asked, 'Who is this that brings the sacrifice
 So graceful and peace-giving as he goes ?
 What is his caste ? Whence hath he eyes so sweet ?
 Can he be Sâkra or the Devaraj ?'
 And others said, 'It is the holy man
 Who dwelleth with the Rishis on the hill.'
 But the Lord paced, in meditation lost,
 Thinking, 'Alas ! for all my sheep which have
 No shepherd ; wandering in the night with none
 To guide them ; bleating blindly towards the knife
 Of Death, as these dumb beasts which are their kin.'"

The King being informed that a holy hermit was bringing down the flock for the sacrifice, watched the approach of Siddartha to his hall of offering. There the white-robed Brahmans were already engaged at their butchery and keeping up the fires on the altars. A goat was just ready for the slaughter :

"A spotted goat, long-horned, its head bound back
 With munja grass ; at its stretched throat the knife
 Pressed by a priest, who murmured, 'This, dread gods,
 Of many yajnas cometh as the crown
 From Bimbisâra : take ye joy to see
 The spirted blood, and pleasure in the scent
 Of rich flesh roasting 'mid the fragrant flames ;
 Let the King's sins be laid upon this goat,
 And let the fire consume them burning it,
 For now I strike.' But Buddha softly said,
 'Let him not strike, great King !' And therewith loosed
 The victim's bonds, none staying him, so great

His presence was. Then, craving leave, he spake
 Of life, which all can take, but none can give,
 Life, which all creatures love and strive to keep,
 Wonderful, dear, and pleasant unto each,
 Even to the meanest ; yea, a boon to all
 Where pity is, for pity makes the world
 Soft to the weak and noble for the strong.
 Unto the dumb lips of his flock he lent
 Sad pleading words, showing how man, who prays
 For mercy to the gods, is merciless,
 Being as god to those ; albeit all life
 Is linked and kin, and what we slay have given
 Meek tribute of the milk and wool, and set
 Fast trust upon the hands which murder them.
 Also he spake of what the holy books
 Do surely teach, how that at death some sink
 To bird and beast, and these rise up to man
 In wanderings of the spark which grows purged flame.
 So were the sacrifice new sin, if so
 The fated passage of a soul be stayed.
 Nor, spake he, shall one wash his spirit clean
 By blood ; nor gladden gods, being good, with blood ;
 Nor bribe them, being evil ; nay, nor lay
 Upon the brow of innocent bound beasts
 One hair's weight of that answer all must give
 For all things done amiss or wrongfully.”

I have no doubt that the expression—

“In wanderings of the spark which grows purged flame,”
 is a true Buddhistic idea ; the end of all being purified flame of
 everlasting life instead of annihilation ; or the life that is ever
 succeeded by decay and death.

I think I have written to you twice already on the subject of the
 carnivora and their victims. It is written of the retreat of Siddartha
 that at night—

“Yelped

The sleepless jackals round his cave, or coughs
 Of famished tiger from the thicket broke.”

These and other carnivora, part of the same creation as the sheep and goats, are adapted and ordained by Nature to consume the latter, mystery as it is; just as man is ordained to subdue the earth by destroying the more powerful carnivora who would feed also upon him, as well as upon the sheep and goats, if spared. Thus the rapidly multiplying victims, which supplied not only the food of the carnivora, but also always sufficient flocks to survive and keep up future generations of supply, fall to man's use. For having destroyed the destroyers he must do their natural work, even if he himself remain herbivorous. Still I am sure that you and I both feel with gentle Prince Siddartha—What a pity it is! But it is not man's cruelty and sin. It is his natural destiny, mystery as it is.

At length, after six years of self-mortification in cavern and jungle, and at a time of great physical weakness, the Light of the Law and Truth is said to have burst upon his mind, and he attained the Buddhahood, or Enlightenment. And from this the thirty-sixth year of his age we will speak of the Prince Siddartha as Buddha. But the newly acquired light not only revealed to him the law which he was to preach to mankind; but also the immense difficulty he must encounter in changing the religious faiths and habits of mankind; and especially in destroying the ritualism of Brahmanism. But his unabated Compassion urged him on. He now saw that his Mission could not be advanced by seclusion in a cavern in the jungle, and he said to his disciples: "I now desire to turn the wheel of the excellent law; for this purpose am I going to that city of Benares, to give light to those enshrouded in darkness, and to open the gate of immortality to men." Here again he promises immortality; not annihilation.

And now let us see what was The Enlightenment. It was called "The Four Great or Excellent Truths":

First. That in all existence there is sorrow.

Second. That all existence results from attachment to life, or desire.

Third. That existence may be extinguished, by extinguishing desire.

Fourth. The desire may be extinguished by following the path to Nirvana.

Now we have seen that he promises immortality to men, and the

term "existence" here means *mortal* existence : that which is "birth, decay, death ; birth, decay, death ;" the transmigratory existence. Nirvana means the heaven of rest and immortality ; not, as is said, the final awful horrid annihilation. Buddha described the calm and happy state of "universal kindness" which he and his disciples attained to in *this life*, as "Nirvana even in *this life*." Therefore Nirvana was not annihilation.

Now here is a Buddhist enlargement of The Four Great or Excellent Truths discovered by Buddha :

"What are the four sublime truths? Sorrow ; the production of sorrow ; the extinction of sorrow ; the path which conducts to the extinction of sorrow. What is the sorrow which is the first great truth? It is birth, old age, disease, death ; it is being bound to what you hate and separated from what you love; it is powerlessness to obtain what you desire and seek. What is the production of sorrow? It is the ceaseless, ever-recurring desire, accompanied by pleasure and passion, to find satisfaction in one thing or other. What is the extinction of sorrow? It is the complete destruction of this ever-recurring desire ; it is detachment from this desire—its abandonment, extinction, annihilation ; it is the perfect renunciation of this desire. And what is the path which conducts to this? It is the path which is laid down by these eight things : right views, right will, right effort, right action, right living, right speech, right thought, and right meditation." Here is so much right that there is no room left for any wrong. The practice of all these right things constitutes the passage to Nirvana ; and in the establishment of all these right things in a man, Nirvana may be reached and enjoyed in this life as well as forever. And this Nirvana must be a Heaven of Love, since it can only be attained by perfect self-abnegation, or *willingness* to die oneself for the rescue of others from sorrow and pain. Surely this is a very Divine Consciousness and no nihilism.

The following are said to be Buddha's own words : "Existence is a tree ; the merit or demerit of the actions of men is the fruit of that tree and the seed of future trees ; death is the withering away of the old tree from which the others have sprung ; wisdom and virtue take away the germinating faculty, so that when the tree dies there is no reproduction. This is Nirvana." This is said to settle the question of annihilation in favour of annihilation ; but it does not. The

"wisdom and virtue" only take away the "germinating faculty"—which is the sorrowful mortal transmigratory faculty; the "wanderings of the spark" for self-purification; the "birth, decay, death; birth, decay, death;"—only *after* the "wisdom and virtue" of the human life have *perfected* the flame of immortal life; and rendered the germinating faculty no longer necessary for the purification of the spark. The same misinterpretation has been applied to the following Buddhist passage: "The heart, scrupulously avoiding all idle dissipation, diligently applying itself to the holy law of Buddha, letting go all desire and consequent disappointment, fixed and unchangeable, enters on Nirvana." For Nirvana read "Heaven of perfect love; the accomplishment of the object and purpose of all life; the condition of the 'purged flame,'" instead of annihilation.

In a reply of Buddha which I was just about to quote, the word "Karma" appears; a transmigratory word the sense of which you may have forgotten. The word "Karma" is translated "Act," but "Account" would be better; or "Condition after balance of account;" for it means the condition of the soul after the balance of debtor and creditor account of actions, good and bad, during life. The Karma is the net moral result of life at death, a condition of soul which passes into a new existence, modified accordingly, from the last, according to merit or demerit.

The idea seems to be that the spirit of all organised things has in some mysterious way gone wrong; and life in its physical organisation and existence—the mortal life—is a sort of punitive means of purification or correction; consisting of as many stages or steps as there are species and conditions. Life well spent adds to the credit of the well-spender in his Karma, and lifts his soul higher; while a life ill spent adds to the debit of the ill-spender in his Karma, and pushes his soul down lower and farther from Nirvana, the Heaven of Perfection and Redemption.

It is written of this Nirvana: "The highest condition, the Buddhist's perfect blessedness, is attained only by those who have so absolutely conquered self that they do not even desire continued existence for themselves, but have given up their hold of everything, and have thus attained perfect inward peace and charity." And this next is the sentence with the word "Karma" in it which I was about to quote. Buddha being asked by some young dignitary to explain his

secret, replied :

" Illustrious youth, if a man let go his hold on the world so as to store up no further Karma, this man will understand the character of permanence and non-permanence." And to another he said " When the world, weary of sorrow, turns away and separates itself from the cause of all this sorrow, then, by this voluntary rejection of it, there remains that which I call ' the true self.' " Not nothingness. This is the Nirvana *in this life*.

I have not yet touched upon the question of final Absorption into God, which you suggested for thought, and which caused me to write these letters on Buddha, apart from the reference to him by the Author of " Modern Science and Modern Thought " which I have quoted. As this letter is long enough I will ask leave to return to the subject, and, I trust, conclude it, in another.

LETTER XXXVI.

THE SACRED BODHI-TREE.—BUDDHA TEMPTED BY MARA THE PRINCE OF DARKNESS.—HE COMMENCES PREACHING.—HIS RAPID SUCCESS.—HE SENDS FORTH SIXTY APOSTLES.—RESEMBLANCE BETWEEN THE BUDDHIST AND CHRISTIAN EPOCHS.—KISAGOTAMI AND HER DEAD CHILD.—PURNA THE BUDDHIST APOSTLE,—THE LAST HOURS AND WORDS OF BUDDHA.—HIS RELIGION OF UNIVERSAL LOVE.—THE BRAHMAN AND MAGIAN RELIGIONS OF WORLDLY GAIN.—XENOPHON'S " CYROPÆDIA."

12 JUNE, 1892.



T is written that when Prince Siddartha became Buddha by receiving the Light of the Law and Truth which I have described, he was sitting under the sacred Bodhi-tree, sacred ever since. It is said to be the Tree of Wisdom, and the Tree of Knowledge of Good, as distinguished from the Tree of Knowledge of mixed Good and Evil which had kept the human Karma so long an open account, and the path to Nirvana so incompletely trodden. And while he sat there in the wilderness he was assailed by Mara the Prince of Darkness and demons, with the most powerful temptations and terrors, to divert him from his mission

among other arguments offering him what he had already renounced, the Kingdom of all the earth. But Buddha was impregnable, and in a few days started for Benares to commence his career of preaching.

It is recorded that when Buddha commenced to preach his message of salvation to mankind his followers increased rapidly. The mild but princely majesty of his mien, the burning eloquence of his earnestness, the skill of his unfailing logic, his divine self-denying charity, and his yearning Compassion, all reached the hearts of his hearers and made rapid and numerous converts. Although he wore the yellow robe and carried the alms-bowl of a beggar, it was well known that he was a great Prince, who took this condition, not for the alms, but in pure self-humiliation, and in exchange for the splendour and luxury of royalty. Which royalty he could have re-assumed at any moment, not only his own inheritance from his royal father, but king Bimbisara, he of the sacrifices, had also offered him the heirship to his own kingdom besides, if he would at once become that king's adopted son and reside with him. He had now many apostles who had acquired the gift of his powerful preaching, and to whom he gave authority to admit members to the Church of the new faith. There were a chosen sixty of these whom he sent out in all directions radiating from Benares, as preaching mendicants without baggage or provision, but merely the yellow robe and alms-bowl, like unto his own habit. In sending them forth he said : "Having myself escaped from all sorrows, I desire my own profit to redound to the good of others : there are a vast number of men enthralled by grief—for these we ought to have some care and compassion. Go now, therefore, and teach the most excellent law. Explain the beginning, the middle, and the end of the law to all men without exception ; let everything respecting it be made publicly known, and be brought to the broad daylight." He was so earnest because he so thoroughly believed in the law which he had discovered, and in the divinity of his mission. He shews it in the following passage, and shews also what he means by Nirvana : He described himself as "the father and mother of his helpless children, their guide and leader along the precipitous path of life ; shedding the light of his truth like the sun and moon in the vault of heaven ; providing a ferry-boat for passengers over this vain sea of shadows ; as a propitious rain-cloud, restoring all things to *life* ; providing *salvation* and *refuge*, by directing

men into the final path, that that leads to the *eternal city*." This eternal city does not sound annihilistic. The stresses are mine.

You must have been already struck with some remarkable coincidences in the Buddhist and Christian epochs. Like the founder of Christianity the founder of Buddhism appears to have written nothing, but only preached; his sayings being treasured and preserved in many minds, and promulgated from mouth to mouth, and nothing lost. It appears to have been about four hundred and fifty years before the traditions and scattered records of his sayings and doings were collected and carefully collated at Ceylon and made to constitute the Buddhist Holy Scripture. During the forty-five years of his mission, after his Enlightenment, he is said to have delivered eighty-four thousand discourses, which are said to be comprised in one hundred and eight volumes called Gandjour, or Verbal Instruction; also Bana, or The Word. And the practice of sending forth his sixty Apostles to preach his Word appears to have been continued yearly during Buddha's lifetime, all returning to reunion at Benares at the approach of the rainy season. The following stories have been so often told that they must be familiar to you; but they are too good to seem to be told too often.

Hindoo girls marry very early, and Kisagotami was quite a young girl when she had a darling baby-boy, who, almost as soon as he could walk, died. The young girl-mother refused to believe her darling dead, and went from house to house asking for medicine to revive it. At last a man who understood the case said "Alas! this Kisagotami does not understand the law of death. I must put her in the way of getting comfort." "My good girl," he said to her, "I cannot myself give you medicine for your child, but I know of one who can."

"Oh, tell me who that is."

"The Buddha can give you medicine; you must go to him."

She hastened to Buddha and said: "Lord and Master, do you know any medicine that will be good for my child?"

"Yes, I know of some. Get me a handful of mustard seed; from a house where no son, husband, parent, or slave, has died."

"Very good," said the girl, and went on the errand. Plenty offered her the mustard seed, but when she asked:

"Has there died a son, a husband, a parent, or a slave, in this house?" they replied:

"Lady, what is this that you ask ? The living are few, but the dead are many !"

At other homes she was answered, "I have lost a son." "I have lost my parents." "I have lost my slave."

And she could find no home where no one had died ; and began to think :

"This is a heavy task that I am on."

And then she began to be enlightened and understood that her child was dead, and went and left it in a forest, and returned to Buddha.

"Have you procured the mustard seed ?" he asked.

"I have not. The people told me that the living are few, but the dead are many."

"You thought," said Buddha, "that you alone had lost a son : the law of death is that among all living creatures there is no permanence." Thus he caused her mind to be enlightened, led her to contentment, and she became one of his disciples.

A rich merchant named Purna, having embraced Buddhism through the teaching of a fellow voyager on board ship, resolved to forsake his calling, and reside with a neighbouring savage tribe with the view to their conversion. Buddha thought the undertaking too perilous, and told his apostle so.

"The men of Sronaparanta, where you wish to fix your residence," said he, "are violent, cruel, passionate, fierce, and insolent. When these men address you in wicked, brutal, gross, and insulting language, when they storm at you and abuse you, what will you do, O Purna ?"

"When they address me in wicked and insulting language, and abuse me, this is what I will think. These men of Sronaparanta are certainly good and gentle men, who do not strike me either with their hands or with stones."

"But if they strike you, what will you think ?"

"I will think them good and gentle, because they do not strike me with cudgels or with the sword."

"But if they do strike you with the sword ?"

"I will think them good and gentle, because they do not completely deprive me of life."

"But if they do deprive you of life, what then ?"

"I will think the men of Sronaparanta good and gentle, for de-

livering me with so little pain from this body so full of vileness."

"It is well, Purna," said Buddha ; "with your perfect patience you may dwell among the Sronaparantakas. Go then, O Purna, thyself delivered, deliver others ; thyself arrived at the other shore, help others thither ; thyself comforted, comfort others ; having attained complete Nirvana, guide others to it."

It is said that Purna succeeded with the Sronaparantakas. Inasmuch as Purna replies to Buddha that after he is killed he will think so and so, and Buddha does not correct him, it is clear that they both knew Nirvana to be a state of *consciousness, and not annihilation*. What a good Christian this Purna must have been ! And such as he, like the missionaries of early Christianity, tamed some of the fiercest of the savage tribes of the East, because they preached a gospel essentially of universal charity and compassion.

Now picture Buddha in his eighty-first year. For forty-five, if not fifty years, he has been living in Nirvana on earth, and now he is about to pass to complete emancipation—to Nirvana in Heaven—Heaven in Heaven. During the last hours of his last night on earth while his friends were trying to secure him quiet undisturbed, he overheard the voice of a distinguished Brahman philosopher pleading to be allowed to ask him one or two final questions, and Buddha desiring him to be admitted said :

"This is not the time for discussions. To true wisdom there is only one way, the path is laid down in my law. Many have already followed it, and conquering the lust and pride and anger of their own hearts, have become free from ignorance and doubt and wrong belief, have entered the calm state of universal kindliness, and reached Nirvana even in this life. Except in my religion the twelve great disciples who practise the highest virtue, and stir up the world to free it from its indifference, are no where to be met with. O Subhadra, I do not speak to you of things I have not experienced. Since my twenty-ninth year I have striven after the supreme wisdom, and followed the path which leads to Nirvana." Then these were his last words to his disciples :

"Beloved, that which causes life, causes also decay and death. Never forget this ; let your minds be filled with this truth. I called you to make it known to you." Life, here, of course, means mortal life, subject to decay and death ; and his great teaching was that it

was so temporary as only to be worth spending in making sure of eternal life, or permanency of happiness ; and that it must be spent especially in bringing about as soon as possible the eternal life of others, by shewing them how to wipe out their Karma, or balance of demerit, and finally close that account by self-conquest and benevolent acts of merit. He shewed that there could be no merit associated with selfishness ; but only with universal kindliness or love. His teaching was the same as Christ's teaching—Love one another and lay up your treasure in Heaven, where alone it will be permanent ; and that could only be done, on the human side, by the merit of acts of self-denial, and universal brotherly love in this life, and abhorrence of the evil of selfishness.

It is another curious coincidence that Christ in Palestine, and Buddha in India were equally destroyers of sacerdotalism and the altars of sacrifice—of sacrifice to the priests rather than to God. The ancient Brahman priesthood was a cruel arrogant hierarchy, existing only for itself—to gain and to govern—rather than to teach morality by precept or example. It placed itself in the self-seized position of gate-keeper to God and Heaven, and receiver of all the gifts of mankind offered at the gate—to be appropriated by the priests themselves, of course. What they said belonged to Brahma, Vishnu, or Shiva, they took for themselves. Religion meant ceremony, which none but the Brahman priests could possibly conduct ; and the abundant rich fees attending which, none but they could touch. And while they were the recipients of all the fees and sacrifices offered to all the gods, they were also the disbursers of salvation. They and they only were the necessary mediators between the gods and men. Therefore the success of Buddha and his apostles in proclaiming the simple religion of universal charity, and the abolition of ritualism and caste, was a great blow to Brahmanism ; and it was near being extirminated in India. But the Brahmans were a great power and, ultimately reforming their religion somewhat from the Buddhistic pattern, they re-established their sacerdotalism. It is a remarkable circumstance that in the midst of his overwhelming successes in the propagation of his new gospel Buddha prophesied that his religion should be driven from Hindostan, by Brahmanism, to the hills ; which was accomplished more than one thousand years after his death, and about six hundred years after his "Verbal Instructions" had been committed to writing.

He also prophesied that his religion would last for five thousand years, and would then be superseded by the teaching of another Buddha. About half that period has already passed.

The priests as gate-keepers of the gods for the sake of the offerings made at the gates, invented many gods for the sake of many gates, that the gate-keeping and its profits might be the greater. And this has been the rule with all the long-established faiths of the world ; only that in some such faiths many functions, ceremonies, and sins, all fee-producing, take the place of many distinct gods. If a law could be passed that no religious fees should be offered or accepted, what a crowd of *unemployed* gate-keepers would be the consequence ! Buddhism with all its original Christian—pre-Christian—simplicity, has not escaped ; and the supremely generous self-sacrificing Buddha, refuser of all wealth and a kingdom, is now represented in nearly all his popular images as a Divine Beggar, with his hand ever open for a fee from all who come to pray at his shrine. His false priests will undertake to forward the prayers of his supplicants for money ! How shocking it would be, with all our knowledge of Christ's Own life and teaching, if the priests of any sect of Christians should accept money from sorrowing heartbroken weeping friends, to offer prayers for the souls of the dear departed—purchased prayers for poor souls, to Christ and His Mother ! Yet such I believe, and you would hardly believe, is done among modern Buddhists. The Buddhist shrines and monasteries are richly endowed by pious princes and peoples ; yet the ever insatiable cry is “Give ; give ; give.” It has become a mere religion of begging on the part of the thousands of its hierarchies and their immediate religious dependents, who have thrust themselves in where they were never needed ; in places never ordained for them by Buddha. They claim that the universal charity and kindness preached by the Founder shall flow to and through themselves. They are as rapacious as ever were the Brahmans whom Buddha denounced.

How shocking it would be if such a system had crept into Divine simple Christianity ; and men became leaders therein for place ; re-establishing therein the old pernicious sacerdotalism, ceremony, and begging alms-bowl, plate, money-box, or bag !—all in the name of Christ ; who, like Buddha, refused the worldly kingdom of this world and all its readily-yielded riches, when they were offered to Him ; and

preferred poverty to fees and stipends, accepting only the bare hospitality of the hospitable.

But alas ! we see that all religions become corrupt when they become sacerdotal ; and are then conducted for worldly gain. As with the Brahmans of India and the intrusive priests of Buddha, so it was with the Magi of Media and Persia. I have been glancing again at Xenophon's *Cyropædia*, and noting the ascendancy and conduct of the Magi in the affairs of Cyrus. If all things are not strictly historically accurate in the books of Xenophon, he accurately represented the habits and customs of that reign. There is reference to a present to the gods from the spoils taken on the march towards Babylon, when Cyrus commanded to be "delivered to the Magi that which is due to the gods." Of course the gods got none of that. Then again after the taking of Sardes, or Sardis, the city of Croesus, Cyrus "directed some of them to receive the treasures, and others to select from amongst all the riches that Croesus should deliver up, first, such portions for the gods as the Magi should direct, and then to take the rest, and putting it into chests, place it on the wagons." Here the selection seems to have been left to the Magi ; but certainly none of it reached the gods. Again, after the taking of Babylon, and the collection of the loot, Cyrus "first summoned the Magi, and directed them to select the first fruits of the spoil for the gods." And they did so ; and the gods never had any of that. And thus the priests obtained wealth by false pretences, as from the beginning of sacrificing priesthoods to this day. For we know now that those gods were false and non-existent, therefore unapproachable with gifts, while the Magi who actually received the gifts were very real.

Alas ! here is already another lengthy letter, and I have not yet nearly said all I have to say about these things. Said too much by far, already, some would say !

Still I will beg leave to say the rest in another letter.

LETTER XXXVII.

BUDDHA'S HEAVEN-ON-EARTH, AND FINAL HEAVEN.—HIS "KARMA"
AND CHRIST'S "BORN ANEW."—THE THEISM AND PRAYER-
FULNESS OF BUDDHISM.—BRAHMANS AND BRAHMANISM.—

BUDDHA FURTHER COMPARED WITH CHRIST.—THE “ASCENSION” OF EACH.—ULTIMATE ABSORPTION? OR ETERNAL INDIVIDUALITY?—BY THE WATERS OF THE DEE AT LLANGOLLEN.—INDIVIDUALITY MEANS LOVE, ABSORPTION ALL SELF.—NEGRO REDEMPTION.

30 JUNE, 1892.



It is said that Buddhism is atheistic; yet there are no people who pray more than Buddhists. I trust to be able to shew that it is no more atheistic than annihilistic. It is true that Buddha did not believe in the Pantheon of the Brahmans; and himself undertook to “shake the seats of the gods.” But it is certain that he believed in Supreme Omnipotent Love, by means of which he overcame the temptations of the powerful prince of darkness and demons. His law was entirely based on this Omnipotent Love. He acknowledged the existence and power of Mara the Evil One, and to deny an opposing and opposite *Superior* One, would be to leave Mara the prince and chief of all, and, consequently, God; but God of malevolence instead of benevolence. In other words, how could he recognize a Mara, prince of darkness and demons, and not recognize a superior God to keep the Devil and all his angels in subjection? If there were a devil prince and no God, the devil prince would be as God, or power unrestrained. When Mara, the Evil One, sought to prevent his Buddhahood by temptations and terrors, it was by the superior power of Sustaining Love that Buddha came off conqueror; and that sustaining Love, so omnipotent, is God; and was so regarded by Buddha, who shewed the path to His “Eternal City”—His Nirvana. It was Love and Compassion that made His Nirvana *even in this life*. The career of the true Buddhist was a sort of “Pilgrim’s Progress” career. In sacrificing all his worldly joys he had such a steady faith in the *future permanent state of blessedness*—it was so real to him—that its realization in faith made even this life his Heaven on earth. How could he possibly have had that unshakable faith, unless it included faith in the Almighty Beneficent, with Mara the Spirit of Evil loose and active, which he also believed? Without an Almighty God, and faith in Him, there could have been no security, and no peace, for the Buddhist pilgrim. But he had peace, and lived in Heaven on earth

He could not, as a human being, be so filled with faith and love, as he evidently was, without extending that faith and love to the great Source of his peace. These are the words of Buddha, and of all his followers—words of pre-Christian love rooted in faith :

“A man who foolishly does me wrong, I will return to him the protection of my ungrudging love ; the more evil comes from him, the more good shall go from me.”

This beats mere faith in God. This is, assuredly, very Divine Love ; proving that not only did Buddha live, as he asserted, in Nirvana—God’s Heaven-on-earth, but that God lived in him very much.

I have remarked on the striking correspondences of incidents in the Buddhist and Christian epochs. There is one in connection with this great temptation of Buddha in the wilderness. Of Christ it is written that he fasted in the wilderness forty days and forty nights, and was then hungry. And then, while he was yet hungry and faint the tempter came, offering Him “all the kingdoms of the world, and the glory of them.” And after Jesus had said : “Get thee hence, Satan!” and he went, angels came and ministered to Jesus. Of Buddha it is written that while in the wilderness, or jungle, suffering self-denial, his physical strength gave way so that he swooned from physical inanition, just before Mara appeared before him, to tempt or terrify him from the Buddhahood, offering him the kingdoms of all the world, and all the world’s sensual delights, which he paraded before him to tempt him. Buddha resisted, and Mara fled, and the devas, or angels, rejoiced ; or, as the divine author of “The Light of Asia” writes :

“So glad the world was—though it wist not why—
That over desolate wastes went swooning songs
Of mirth, the voice of bodiless Prets and Bhuts
Foreseeing Buddh ; and Devas in the air
Cried ‘It is finished, finished !’”

Another curious coincidence is the transmigration, or being born again, which Buddha taught, by which the Karma, or sins, shall be ultimately wiped out, and the “Eternal City” gained ; and the declaration of Christ that “Except a man be born anew, he cannot see the kingdom of God.” Whenever I see a man or woman

confirmed in wickedness I say he or she will have to be born again. And I believe it.

To return to the subject of the habitual prayerfulness of Buddhists, not only is it the habit of modern Buddhists, but it was the ancient habit. There is an old prayer so old that only the articulate sounds remain, and the exact meaning has been lost. But the suppliant *knows* and feels that it is something good, and welcome to God as a heart-given expression of faith ; and he goes on uttering it secretly at all times. It is given as "Om mani padme hum" ; and it is written that these are the first articulations which a child is taught, and that they are the last utterance of the dying Buddhist. Also, "The wanderer murmurs them on his way, the herdsman beside his cattle, the matron at her household tasks, and the monk in all the stages of contemplation. They form at once the cry of battle and the shout of victory. They are to be read wherever the Lama Church has spread, upon banners, upon rocks, upon trees, upon walls, upon monuments of stone, upon household utensils, upon human skulls," etc.

In rejecting the host of gods invented by the Brahmans, it does not follow that Buddha rejected Brahma. He questioned the Brahmans about Brahma, but was not therefore an atheist. He tried to comprehend an infinite God, and found that he could not, and sought help from the greatest philosophers of his people. He was puzzled about the origin of evil, and could make nothing of it ; but said it would not be right to put all the sins of the guilty on the shoulders of God. So he placed his Karma in the stead of God in that matter, and some writers therefore assert that his Karma was his only god, though no god, and therefore he was an atheist. That is very silly seeing that all his teaching was directed to the destruction, or wiping out, of Karma, the balance of demerit ; because the moment the demerit was counterbalanced by merit, the account, or Karma, no longer existed, and the saved one immediately entered Nirvana for ever. His great Enlightenment, or discovery, was this mode of wiping out the Karma. The previous Brahmanistical idea of transmigration was that it was interminable, like the incessant rotation of a wheel. It is described in these words :

"The being subject to birth may at one time sport in the garden of a Deva, and at another be cut into a thousand pieces in hell ; at

one time he may be Maha Brahma, and at another a degraded outcast ; at one time he may eat the food of the Devas, and at another he may have molten lead poured down his throat ; at one time he may sip nectar, and at another be made to drink blood ; alternately he may become wild with pleasure, and then with pain ; he may now be a king who can receive countless gems by the mere clapping of his hands, and now a mendicant, carrying a skull from door to door to gather alms."

All these elevations and degradations from Brahma to a demon, and back, and, consequently, from Heaven to Hell, and back, were considered to be in course of operation with all beings subject to re-birth, and the old faith was that *all* were *always* subject to re-birth. The wiped-out Karma and the blessed Nirvana were unknown ; and even Brahma, or portions of his spirit were subject to re-birth in degradation. This seemed so absurd to Buddha, that he had no great admiration for the Brahman's Brahma, and was very inquisitive about him, as I have said, and argued with the sages about him, getting thereby the reputation of an atheist. As the Hindoo philosophers could not satisfy Buddha about their Brahma, they turned upon him for *his* explanation of the origin of the world and man. Of course he could give none ; and, very wisely, as I think, he declared the question to be profitless because unanswerable, and that he himself enquired, *not as a disputant*, but as one "who participates in the great mass of evil which exists, and who seeks only a physician." In one of Buddha's recorded sayings there is this passage :

"To feed one good man, however, is of infinitely greater merit than attending to questions about heaven and earth, and spirits and demons, such as occupy ordinary men." Thus was he practical, and for the avoidance of vain theories. And in the same discourse he speaks about "learning to pray"—"from a desire to save all living creatures." And thus was he no atheist ; but very Divine.

It was the want of finality of Brahmanian transmigration, to which I have just referred, that set Buddha preparing for his great mission. After a discussion with some sage ascetics he is said to have said :

"Venerable sirs, I perceive that your system, although it promises the reward of heaven to certain persons, yet provides no means of *final* deliverance. You give up all, friends, relatives, and worldly delights, and suffer pain, that you may be born in heaven ; not

considering that after being thus born on high, you may in future years return and be born even in hell." Instead of "be born in," and "born on," it would have been better translated "enter into heaven" and "entered on high."

Now, so far were the Buddhists from being atheists, that they worshipped Buddha himself, as Christians worship Christ. And here again is a remarkable resemblance. Buddha is described in these words : "A Divine incarnation; a God-man, who came into the world to enlighten men, to redeem them, and point out to them the way of eternal bliss." These words are exactly applicable to Christ. And here is another description of Buddha : "A personification of the Divine attribute of Wisdom in human shape. A Divine incarnation, a God-man, possessed at once of a Divine and a human nature. Once a man, yet in virtue of his Buddhahood, having had his humanity so completely lost in his Divinity, that he is in reality God, a man-God."

And thus he was styled : "The joy of the whole world ; the helper of the helpless ; the Deva of Devas ; the Brahma of Brahmas ; the very Compassionate ; more powerful than the most powerful." Buddhism is no more atheistic than is Christianity, and no more annihilistic. For if death and Nirvana meant annihilation, how comes Buddha to be a living God, worshipped and prayed to at this moment by more than one third of all the human race ? There must have been other Brahmas, too, in the mind of the Buddhist, or he would not have designated Buddha the Brahma of Brahmas.

The Godhood of Buddha is said to have been acquired with his Buddhahood, at the time of the repulse of Mara the tempter ; and the description of his attributes then acquired is worthy of a glance at here. It is said that he acquired a knowledge of "the exact circumstances of all the beings that have ever existed in the infinite worlds." Surely this is Divine Omniscience, very neatly expressed. And it is curious that so long ago there should have been any idea of "infinite worlds." Then, "he received the Divine eyes by which he had the power to see all things within the space of the infinite systems of worlds as clearly as if they were close at hand." Surely this is Divine Omnipresence, or Infinity close at hand. A magnificent and most advanced idea. Then, "he attained the knowledge by which he was enabled to understand the sequence of existence, the cause of all

sorrow and of its cessation." Surely this is Divine Omnipresence.

It is very wonderful that Buddha should have taught that there were *numberless* systems of worlds—suns, planets, and moons scattered throughout space.

And now let Divine Buddha ascend to heaven out of our sight. For he also, like Christ had his Ascension to Heaven. It was from the summit of a mountain called Adam's Peak in Ceylon ; and there to this day is pointed out what is said to be the impression of his foot which he left there. But he appears to have returned and died a natural death as before mentioned.

And now, at last, we come to the consideration of the question about final Absorption, or immortal Individuality ; which? You ask : "Are we to be absorbed *again* into the Deity? If that be so we shall be God Himself, and be able to grasp Time, Space, etc., and know all things. . . . I cannot believe that I shall ever become 'God.' I hope we shall ever retain individual consciousness. 'Each a soul, shut in by itself, a sundered atom of Thee.' "

The Brahmans, when they had nearly lost their supreme power in India, owing to the spread of Buddhism there, examined this question, and adopted Absorption in place of the old Never-ending transmigration dogma. They concluded that as all things had been evolved from Brahma, all things must be re-involved in him. They wrote : "As the threads from the spider, the tree from the seed, the fire from the coal, the stream from the fountain, the waves from the sea, so is the world produced out of Brahma." And then, "It is with us when we enter the Divine Spirit as if a lump of salt was thrown into the sea: it becomes dissolved into the water from which it was produced, and is not to be taken out again." "As flowing rivers are resolved into the sea, losing their names and forms, so the *wise*, freed from name and form, pass into the Divine Spirit, which is greater than the great. He who *knows* that Supreme Spirit, becomes spirit."—"Whoever knows this—'I am Brahma,' knows all. Even the gods are unable to prevent his becoming Brahma." "Know him, the Spirit, to be one alone. Give up all words contrary to this. He is the bridge of immortality." "Crossing this bridge, the blind cease to be blind, the wounded to be wounded, the afflicted to be afflicted; and on crossing this bridge nights become days, for ever-resplendent is the region of the universal Spirit." Thus thought and

taught the later Brahmans on this subject.

And this idea of perpetual day reminds me to say, in passing, how curious it is that the general mind, from its experience of the ever successive night and day, seems to regard the sequentiality as universal. Whereas, if we can only imagine ourselves, or anything, outside the shade and shadow of a planet, night and day are no longer conceivable; as, outside the opaque planets is perpetual light with the face towards the sun, and, perhaps, perpetual darkness looking away from it, except for the opposite stars. But we don't know exactly how this would be either way, without an atmosphere about us to diffuse the light of both sun and stars. Anyway there would be no successive day and night. This idea of "ever-fulgent" the Brahmans evidently grasped, as Buddha seems to have grasped that of countless systems of worlds, before it was revealed by astronomy. And this reminds us that the evenings and mornings of the creation in Genesis could not have been mornings and evenings of ordinary day, succeeded by ordinary night, as that would imply that the Creator was limited, like man, to some terrestrial locality, and that His work was being conducted at one particular spot on the revolving earth.

I quite think and feel as you do about Absorption. The final loss of individuality seems akin to annihilation. But I do not dread it, because I do not expect it. I have studied the question while soothed by the music and motion of the rapid Dee, sitting in a garden on its bank, at Llangollen. I was, with others, the guest of The Fair Maid of Llangollen, immortalized by Charles Matthews. She was then an elderly lady, and has since solved this question that we are discussing.

While watching the hurrying waters of the beautiful Dee, the very simple thought occurred to me that we never see the same waters again. Having come down from the clouds, and flown down the watershed to the river or its feeding streams, they rush on to the sea, where some portion may remain for hundreds of years before the turn of its molecules comes round again to evaporate heavenward; while some other ascends quickly, and some even during the river-rush, all in fresh molecular society, to form new clouds, and sail away and fall on other watersheds. And so on all round the globe and during all the round of time in eternity. The only lasting individuality of the water is its molecular individuality with its constantly changing com-

panionship ; and even that is not permanent. For the oxygen and hydrogen in time part company and there remains only the individuality of the atoms, again to form fresh alliances and companionships. And such alliances and companionships, once severed are humanly speaking severed for ever. I well remember thinking thus while watching the flow of the waters of the beautiful Dee. And one of my companions there was General Yorke, he who had his leg crushed at Balaclava. He also has doubtless solved this question of the survival of individuality ; for he, too, has passed onward. And the train of thought passed onward to the like perpetual changes in all physical organizations, remembering how all flesh changes, and how the water of life in our bodies, so large a proportion of all living creatures, also ascends to the clouds, and flows in the streams, and into the seas. Yet in all nature there is crowded individuality—a constant creation and increase of individualities from the microbe to man ; from the blade of grass to the cedar. Why should it be so in the temporal life and not in the eternal ? We may expect to preserve the immortal personality, although we know that the mortal is all re-absorbed in the mother-earth ; and I will presently shew you why we may expect it.

But when we look to the heavens we see the order of things reversed. Behold the infinite individualities there ! And there, whatever constant changes may be taking place in the affinities of matter, the material individuality of each appears to be perfectly maintained ; while the souls of the stars, or suns, are constantly issuing from each, to be absorbed into one whole, pervading all space. I speak of light and heat.

But you obtain comfort from another thought. Either God is Love, or we may as well be annihilated at once for what good the eternal future will ever be to us. If He absorbed all into Himself, what would there be left to love ? Instead of God is Love, it would be God is All and all Self. The difference would seem to be something like the difference between your love of a peach, and your love for a darling child. When the peach is absorbed in the goddess, there is nothing of it left to love. But while the darling child has living personality, you enjoy the happiness of your love for her, and she of her love for you. So I, a child, do not fear that my Father will either annihilate me, or absorb me, but will keep me in

His Love.

Thus universal personality and love, mean universal joy of reciprocity of love. Absorption must mean one Self, selfish, and loveless. Is this the conceivable result of the millions of millions of individualities even of this one little speck among the worlds of the universe?

Late last night, while reading for rest, I came upon a passage on the subject of American negro slavery, written before the emancipation, in which the writer suggested that slaves should be accorded the privilege of self-redemption, in words which instantly reminded me of Buddha's Karma, thus : " It seems to me that to purchase a slave with the purpose of saving him from a hard and cruel fate, and without any view to emancipation, is itself a good action. If the slave should subsequently become able to redeem himself, it would doubtless be the duty of the owner to emancipate him ; and it would be but even-handed justice to set down every dollar of the slave's earnings, above the expense of his maintenance, to his credit, until the price paid for him should be fully restored."

Somehow we seem to be born slaves, needing redemption, towards which we are to do our part by earning Karma dollars, to balance or extinguish the Karma, and then we mercifully get our freedom. Mercifully, because, although we have done a part in the matter, that part is, alone, altogether insufficient, when it is only the part of a born slave, who has no power or right, in himself, to redeem himself ; and requires the merciful *gift* of freedom, after all, in order to be free.

LETTER XXXVIII.

SEEKING HELL WITH A TELESCOPE.—“ NATURAL SENTENCES AND PUNISHMENTS—AUTOMATOUS.”—THE UNCHARITABLE MILLION-AIRE : HIS SENTENCE.—THE CRUEL MASTER OF MEN, WOMEN, CHILDREN, AND HORSES : HIS SEVERE SENTENCE.—THE PER-VERSE SELFISH WOMAN AND FALSE WIFE : HER TERRIBLE SENTENCE.—THE WRETCHED LAME LIFE-LONG BEGGAR.—THE OVERWORKED BEATEN HORSE.—THE EVER-BEATEN DONKEY

ON THE SEA-BEACH.—THE PUNISHMENT OF TANTALIZATION—
BOTH HELL AND HEAVEN UPON EARTH.—THE FINAL RE-
DEMPTION AND RESTORATION.

3 JULY, 1892.

GWITH the doctrine of the transmigration of souls fresh in mind—promotive as well as punitive and ultimately redemptive as taught by divine Buddha—I have been leisurely observing and pondering upon certain conditions of life at the seaside; and find myself reminded of “Saladin” whose views we have examined in former letters. You will remember that one of his pamphlets, which you lent to me was devoted to “Hell: Where is it?” He searched for Hell and could not find it; failing even with the most powerful telescopes. And he failed, I think, because of the telescopes and the distant search. He might have found the very thing very near home, had he looked thoughtfully there, even without spectacles.

Among my very voluminous manuscripts is one entitled “Natural Sentences and Punishments—Automatous.” This sounds something like the idea of the Clock in Nature. I take the first and last words of the title to signify that the Divine Sentences and Punishments do not need, and do not proceed from, a sitting local Judge who has to hear with his ears, and consider in his mind, and determine every individual case, or life, of wickedness. But that the sentences and their execution are divinely ordained and kept in operation; and have, as it were, automatically worked on in their inexorable courses from the very beginning of the operation of the Divine Plan of Redemption; like regular apparently self-acting fixed effects of fixed causes; as it is with all the rest of the operations of Nature, or God’s Art of Government. It may be called the natural clock, but none the less God’s Own clock, and God-sustained. Not a clock independent of God, but whose power of operation is the active Power of God; and not, I should say, a thing kept going while He sleeps. Yet the developments are all the result of Self-worked, in the sense of Divinely-worked, Almighty Laws; including Birth and Death, both of them belonging to the inevitable, or course of Nature. This manuscript must have been the work of a Seer; who, like Buddha, was able to discover the hidden; and read the past in the present;

or in some mysterious way trace back exact past causes from present current effects. Just as Buddha, by Divine Enlightenment, could trace back the Princess of the then present time, to the tigress of a past age of life. But this may have been done, possibly, not so much by any process of reasoning in tracing backward, as by a sort of retrospective clairvoyance—but in any case it is utter mystery to the ordinary human mind, although it may be a very simple matter in the mind of a little dog.

However, in this curious and interesting manuscript I found the case of a soul which had progressed to prosperous humanity ; but had incurred the dread responsibility of immense wealth, with its two temptations of lavish self-indulgence, and miserly accumulative greed. This millionaire had yielded to both. He studiously accumulated more and more without setting apart an annual percentage for charity ; while denying himself no personal indulgence that his selfish tastes could suggest. The duties of his stewardship did not, of course, require that he should scatter and neutralize the beneficent power of greatly accumulated wealth, by feeding the idle, and pauperizing the poor ; but there are a thousand wise channels for the beneficent helpful outflow of a percentage of such wealth, the neglect of which is a punishable crime. This man practised no charity, and even sent the appealing hungry ones faint and empty away. For this selfishness and abuse of stewardship, according to the manuscript, the natural sentence was :

“ That he should be born again, of water [which is the vehicle of corporeal life] and of the spirit, his soul ; and should endure irremediable poverty and homeless beggary for life.” This was a pretty box of troubles, being inexorable Fate, and “ for life.” And let such sinners beware. But still there was merciful Hope at the bottom of the box, after all ; because the punishment was not eternal. We shall presently see how truly the sentence was executed, or was in course of execution.

Another case is that of the soul of one who in human life had been a hard and cruel master and man ; hard and cruel to men, women, children, and horses ; to sweat unfair money out of their labour. But he was not cruel to his dog. The natural sentence for this heinous wickedness was :

“ To be born again to a life of perfect slavery, and subjection to

the will of the cruel. To be worked, and flogged, and tormented by a devil ; with none to deliver. For in that life every man's hand shall be against him if he attempt to escape from this sentence of bitter captivity and slavery ; and will re-deliver him to his punishment—for life. He shall never have liberty to go to the right nor to the left, nor anywhere in accordance with his own will ; but shall be forced about with a bar of iron in his mouth ; and, without power of speech, shall endure the inevitable punishment—for life. And when his strength shall at length have become enfeebled through his long years of daily toil and torment, he shall then be executed, and his body cast to hungry dogs to tear and devour."

This sentence may seem hard ; but it appears that it was just and necessary, as being both punitive and re-promotive. And we shall presently see how it was certainly executed, or was in course of execution. And then let all such sinners beware. And truly this was very merciful compared to eternal punishment.

Another case is that of the soul of a woman. I am sorry to have to give this ; but there is, it appears, the same human nature and its responsibilities in both sexes ; and the same sentences and punishments for both ; and the same ultimate Redemption to be effected thereby. I believe this case to be a very rare one, for it is a very bad one, and a very sad one. But as some people know of such a life, and as I shall be able to shew that we may ourselves witness the execution, in real life, of such a terrible sentence as was hers, I do not think we ought to regard either the wickedness of the life, or the sentence, as exaggerated by the Seer who wrote of it. This is his description of her evil life :

"This woman was remarkably perverse. From youth upward she ever strove to have what she called her own way ; which meant a way always in opposition to the ways of all authority to which she might happen to be naturally subjected. She was so full of guile that the chief study of her whole life, and the chief uses and objects of her conversation, were to deceive ; and to make herself appear to have been, and to be, what she never was. All this arose from intense baseless pride, and selfishness. In the same spirit she did evil so cunningly and secretly, while openly adopting the false pose of correctness, as to pass among her neighbours for a correct and religious woman. Her concealment of intense selfishness, constant

domestic embezzlement, unholy intrigue, and even deeply schemed homicide—schemed but not accomplished—was a sort of satanic success. So utterly false was she, that her daily life was a daily living falsehood. And this was her natural sentence :

“ To be born again to a life of perpetual slavery, and subjection to the will of the cruel. To be worked, and flogged, and tormented by a devil ; with none to deliver. For in that life every man’s hand shall be against her in the attempt to escape from this sentence of bitter captivity and slavery, and will re-deliver her to punishment—for life. She shall never have liberty to go to the right nor to the left, nor anywhere in accordance with her own will ; but shall be forced about with a bar of iron in her mouth, pressing upon her tongue, that evil misused member in her previous life ; but now entirely without power of speech ; so that she shall dumbly endure the inevitable punishment—for life. And the irresistible devil who shall have her in his charge shall be ever watchful to prevent her from having her own way in the merest trifle. And when her strength shall at length have become enfeebled through her long years of daily toil and torment, she shall then, at last, be executed, and her body cast to the hungry dogs to tear and devour.”

This sentence may seem hard ; but it appears that it was just and necessary, as being both punitive and re-promotive. And we shall presently see how it was certainly executed, or was in course of execution. And then let all such sinners beware. And truly this was very merciful compared to eternal punishment.

Having recounted these sins and sentences the Seer relates how he discovered the poor convicts undergoing their punishments. And by this discovery “ Saladin ” may get his question answered—“ Hell : Where is it ? ”—without the aid of any telescope. The subject of this curious manuscript is certainly very ugly and painful ; but we shall see that it bears the stamp of truth—ugly and painful truth. Yet all ending, we may trust it, in beautiful, happy and merciful Redemption ; and accounting for conditions of life which have puzzled mankind.

The Seer relates that he met a wretched beggar soliciting alms—an aged tramp ever moving on, to and fro in the land, although lame, with a heavily bandaged foot in a large uncomfortable old broken shoe. He was haggard and homeless and propertyless ; all beyond his filthy rags, and sadly broken shoes, and an old stick to aid his

constant hobbling movement on and on and to and fro in the miserable land. This the Seer recognised as the selfish millionaire undergoing punishment ; to whom the fair earth had become a true Hell. And the Seer's heart was touched with pity ; and he imparted a gleam of transient joy to the poor suffering convict ; of which the Judge—the Ordainer of Judgments—would highly approve. For if the heart of man is touched, is not the God of Love more merciful than man ? And even the charity of man—his true charity—is so divine, so powerfully divine, that it is permitted in a Godlike manner to mitigate the just sentences passed on even God's convicts. And the automatic sentence is, after all, one of mercy and not vengeance, leading to ultimate Redemption ; for, whom He loveth He chasteneth ; and that chastenment, mystery as it is, appears to be necessary to the Redemption.

After this the Seer met, in a mining district, a poor horse struggling its zigzag course up a rising road with a too heavy load of coal. And while it strained its very utmost, its owner, the coal-jagger, slashed it with his whip, with no more sympathy than he would have felt in beating a carpet ; and the flesh of the horse quivered ; for the strokes were like strokes of fire. And there was no power to cry out for mercy or help ; and none to heed the cry if there had been ; any more than a passer by will heed the screams of the swine undergoing punishment beneath the knife of its executioner, or attempt its rescue in response. For the condemnation of this poor horse is punishment "for life." And truly this fair earth is his Hell ; and his owner is his tormenting devil ; and will continue so until the day of feebleness and consequent execution ; after which his body will be thrown to the dogs. And even in his living strength and utmost beauty the horse is only spoken of as "horseflesh." And horseflesh and horsewhip are closely associated ideas. The Seer's heart was again sad with pity, as he recognised in all this the punishment of the hard and cruel master of a former life. But he had no power in this case to impart even a transient gleam of joy to the poor suffering convict. His sentence must be fulfilled ; for it is just ; and necessary to his ultimate Redemption ; and very merciful compared to eternal punishment.

Then the Seer wandered along the sea-beach and saw a group of donkeys, all with drooping heads, apparently meditating on their evil lot. They were in charge of boys who touted for riders. One of

these boys, being on the look-out, espied a group of happy children and their happy mothers, away beyond the approaching Seer ; and he quickly mounted one of the weary donkeys and beat it with a stick, with no more sympathy than he would have felt in beating a carpet, to hasteri towards the happy group, shouting incessantly “*Ger-on ! ger-on !*” which being interpreted meant “Get-on !” The donkey, thus stimulated, indeed obeyed, and was “getting on” when her rider instantly checked her unwilling speed by tugging savagely at the bridle, and sorely hurting her mouth with the bar of iron which pressed upon her tongue. Then, cruel fate ! he as instantly shouted again in a savage gruff voice “*Ger-on ! ger-on !*” and again the donkey obeyed, impelled by the stick which was freely applied behind ; to be again checked by the tugging at the bridle. And thus there was the constant alternation of the hot blows of the stick behind, and the burning pain of the tugged bar of iron in front. The Seer, in sorrow and anger called out to the boy, or devil, that he himself deserved to have a taste of such treatment. Upon which the boy, pulling up before him replied, “So I *should* deserve, Sir, if I would never do what I was told.” And the Seer beheld before him the wretched convict undergoing the third sentence. And he thought it remarkable that the boy should have given this reply. For the donkey had been shewing no sign of disobedience on that beach, but actually received punishment for strict immediate obedience ; and yet just as actually, for persistent rebelliousness, and disobedience, as well as other crimes, committed in a previous life.

Of course we well know that all donkeys are not punished as this donkey was ; but many are. And all coal-jaggers do not treat their horses as cruelly as this our jagger did ; but many do. That I well know having witnessed both often. And the general, ordained, life-long slavery of horses and donkeys is a curious study.

I once knew a rich coal-owner in the north—but we were not friends—who declared, and boasted of the discovery, that he found it paid best to get the utmost amount of work out of his horses ; for although the extra work shortened their lives, he gained in the long-run. This man possessed many horses, and, consequently, employed many drivers ; who, to retain their places had, every one of them, to act as our Seer’s jagger did. Perhaps what the coal-owner thought best for himself in the long-run, also proved best for the poor horses in their

long-run, in shortening the period of their punishment. The most-used road from this man's pits was uphill, and I have hundreds of times seen them straining under the lash, and wondered what they had done to be condemned to that hell-upon-earth treatment.

When one thinks of these things there seems to be no alternative between Buddhism—the 'ism of Buddha the most Christlike in his mercy and compassion—and Atheism. For unless these cruelties be part of a punitive and re-promotive scheme, there would seem to be no God caring for these His creatures. But only a Power heedless of justice, and indifferent to right or wrong ; permitting life-long misery to successive generations of the innocent ; which indeed seem to come into the world expressly to endure malignant suffering, such in the end being their accomplished fate. The coal-owner of whom I have spoken has long ago gone to his own account leaving much wealth ; carrying away with him only his awful "Karma." What is he doing now we wonder ?

And another curious part of the torment of many of the horses and donkeys is to be driven, very hungry, through narrow ways which are lined on each side with sweet tempting food ; which they can see, and smell, and long for ; but are not allowed to touch although there are miles of it ; but their mouths are filled with the cruel iron bar instead ; and they are not allowed to turn to the right or the left to taste of the sweet abundance which is spread on both sides, but are lashed onward, with hunger whetted to be unappeased. How this reminds one of the Jovian doom of Tantalus in his ingeniously fabled Hell. Thus, evidently, this fair earth with its sweet sea-beaches, and its sweet flowery lanes, while it is a Paradise to the groups of happy children and their happy mothers, and to happy others who are not only happy in the temporary sweets of the present life, but in the assurance also of further promotion, and hail death as the sure gate of a still higher life—this fair earth with its sweet sea-beaches is equally a positive Hell to the ever-suffering donkey ; driven thereon by an inexorable devil ; and tormented by him there with hot pains every day ; and from whom there is no deliverance until the day of execution.

Yes ; here indeed the dear children's Paradise is the poor donkey's Hell. The sands are its horrid pavement ; the sounds of the waves and winds are its howlings ; the dawn is the harbinger of recurring woes ; the risen sun gives the signal for resumed torments ; and her

only temporary respite—and that ever painful with daily chastisements—is the temporary darkness; shadowing her from the glare of her active Hell of Day.

Now it may appear at first sight that this Hell and these punishments must, after all, be eternal; or intermittently eternal; because punishable cruelty is the adopted means of punishment; and because cruelty is not divinely ordained for the purpose and therefore to be excused; but the existent evil is merely divinely utilized, and the responsibility for the cruelty remains undiminished. “It is impossible but that offences will come: but woe unto him through whom they come!” Thus although the wickedness of the coal-jaggers and the donkey-drivers is utilized in Nature’s automatus process, it is not excused, but there is still “woe” to follow; and such a turn-and-turn-about system might, at first sight, seem to keep up an eternal round of punishment. But it will be seen on investigation that this natural employment of existing cruelty of mind in the execution of sentences, does not make the sin of cruelty undiminishable and eternal—producing eternal punishments. According to the manuscript of the Seer the remedy for this continuity of evil is also as naturally automatus as it is sure. He says that all positive evil is gradually declining in the aggregate. And that all the Creation is not thus far a failure; as it must be if the positive evil of the Universe were not on the decline. And he says that the decline of all positive evil is necessarily accompanied with the decline of punishments; and must continue so; until at length there will remain neither a sinner to be punished, nor a sinner to inflict punishment, which is the same thing. And thus, he says, all devils will have been gradually reclaimed, and redeemed, and restored. And all Hells will have become Heavens of beauty and bliss to all; and the great mysterious Wrong will at length be rectified.

It is interesting thus to learn that the mysterious evil of cruelty which is in Nature, is made Nature’s automatus means of punishment of the evil of cruelty; and at the same time the gradual means of the redemption of all evil-doers. Compared to such vast ends these means appear mere trifles. But they are still part of Nature, or God’s Art of Government; which is very largely indeed made up of *apparent* trifles; as we have seen, and shall yet see. And thus all thought of Divine Indifference is put to flight.

Some will be ready to protest that these cruelties cannot be part of Nature, which is the Action of God, who is Love. In that sense they do at first sight seem unnatural ; yet they are a part of Nature *at present*, being therein utilized, and in that sense and view cannot be unnatural at present. In the great Picture of Nature, as we behold it, there are many deep shadows and pains which seem to our limited understanding unnatural ; but they seem so because they are mysteries to us. And as to what is natural and what is not, I think I have observed in some previous letter that the natural, besides including all that is seen and felt by us and by all creatures, includes also things not yet seen and felt by us ; things which when first seen we are apt to pronounce unnatural, or supernatural, while they become really evidently natural the moment they are first revealed to us, or are experienced by us. These cruelties are as natural while utilized in Nature, as are the offices of the hangman and other executioners, and all other executors of punitive law, lawful in all communities that are beneficently governed and regulated by Law.

LETTER XXXIX.

MRS. JAMESON.—THE SOUL'S EXPANSIONS.—THE SPHINX AND MAN.—
THE SOUL'S EMBODIMENT IN STAR-MATTER.—LITTLE DOGS
AND THEIR MANNERS.—“PERFECT THROUGH SUFFERING.”

7 JULY, 1892.

 OR late-at-night recreation I have been reading “Sketches in Canada, and Rambles among the Red Men,” by that divine Irish lady Mrs. Jameson. It is a series of dated letters, and she is constantly noting down in the midst of her descriptions and narratives beautiful thoughts on philosophy and art, and remembrances which occur to her while writing. The following quotation of a quotation seems to have reference to this our subject of the lights and shadows—the mysteries—in the Picture of Nature as presented to us. She writes :

“On the subject of religion I find this beautiful comparison, but am not sure whether it be Ekermann’s or Goethe’s. ‘A connoisseur standing before the picture of a great master will regard it as a whole.

He knows how to combine instantly the scattered parts into the general effect ; the universal, as well as the individual, is to him animated. He has no preference for certain portions : he does not ask why this or that face is beautiful or otherwise ; why *this* part is light, *that* dark ; only he requires that all shall be in the right place, and according to the just rules of art ; but place an ignorant person before such a picture, and you will see that the great design of the whole will either be overlooked by him, or confuse him utterly. Some small portion will attract him, another will offend him, and in the end he will dwell upon some trifling object which is familiar to him, and praise this helmet, or that feather, as being well executed.

“ ‘ We men, before the great picture of the destinies of the universe, play the part of such dunces, such novices in art. Here we are attracted by a bright spot, a graceful configuration ; *there* we are repelled by a deep shadow, a painful object ; the immense WHOLE bewilders and perplexes us ; we seek in vain to penetrate the leading idea of that great Being, who designed the whole upon a plan which our limited human intellect cannot comprehend.’ ”

If the teachings of Buddha have any authority, and I believe their authority to be Divine ; as do more than one-third of the whole human race at this day ; and not the most ignorant one-third ; then another curious thought arises. The soul, whatever may be its potential expansion and powers, or whatever the ultimate capacity of its full and final maturity, is, in its various incarnations, subject to very varying developments and compressions, so to speak ; each exactly limited and confined and adapted to the physical organization in which it is for the time-being incarnated. We know not what may be its capacities in these various sub-conditions. I say *sub* because I think we may safely conclude that the soul’s human entemplacement is its highest and greatest, thus far, on this planet. In other incarnations in animals it may have some developments unknown to man’s experience—powers which we call instincts ; but occult even to human observation ; of which a sort of clairvoyance appears to be one in the dog. But in the human development there is certainly an extra something which we call human genius—divine genius—or power of intellect combined with manual creative skill, which has never broken out in any other earthly incarnation. And it is accompanied with an acquisitiveness, or love of possession of the works, or

results, of this divine human genius ; to which all other creatures are perfect strangers. However clever a dog may be, understanding human conversation ; or even combinations of trifling actions from which he forms deductions as readily as from words ; or reading one's thoughts in one's eyes if they concern him—yet has he no more appreciation of the “things” which men and women, and even very young children, covet, and love to possess, than he has the power to produce them with his own brain and his own paws. The place for his fore-paws, like his hind-paws, remains on the ground to the last. But man rises up from the quadrupedal attitude—from his infantine gait on all-fours—to an erect godlike-ness ; with fore-limbs and hands stretching forth to perform divine works, which we call works of art and industry. No other incarnation of the soul on this earth has ever possessed this almost infinitely varied creative power ; nor cared, much less craved, for the possession of such “things” so fashioned or created. And thus “MAN” is the only answer to the question of the Sphinx. What further potentialities may be included in our future higher incarnations—if there be more in the course of further promotions—we may yet learn in other stars.

Your esteemed letter is just to hand. It is very curious that while I have been writing the foregoing letter on promotive pains and sorrows, your thoughts, before you had seen it, have been on the very same subject, and you enclose to me a leaflet entitled “Perfect Through Suffering.” It is a little gem of deep mysterious truth.

I so believe in the necessity, mystery as it is, for this loving chastisement, and that it *is* loving, that I remarked to Adeline not very many hours ago when we were walking out and talking on the subject, that, for my own part I felt a real thankful satisfaction at having already passed through so many sorrows ; being sure they were promotive and strengthening and exalting in the end ; and administered in love. For a man or woman to howl at pain, and attempt to drown sorrow, is like yielding to, or flying from, an enemy, and results in the soul’s degradation of defeat. But to endure and face them with faith and patience is to obtain the exaltation of victory ; or virtue in its signification of valour strengthened and crowned. As to the ultimate end or goal of all this, of which you have been thinking and writing to me while I have been writing the last letter to you, I can conceive nothing of it. It is so utterly “Behind the Veil.” But I feel

perfectly sure that it will be all right. There are so many starry Mansions in the Father's House that there will be plenty of room for us; whether during their special starry brightness, or during the possible future eternity of evenly diffused light. And as on earth our immortals dwell and act in organisms wonderfully created of the materials of the earth—*still star-matter*—so our future organisms in higher spheres may be created far more wonderfully and beautifully still; and even still of star-matter. For whatever the state and matter may be, it will be the outcome of Divine Love; of which we have such abundant evidence here; and thus it becomes no matter at all. It is certain, as you suggest, that we shall never hereafter do our thinking again through the same brain that is our present medium of thought; whether the earth happen to be again a stage of our being or not. Hence, perhaps, it may be, that we have no knowledge or memory of our past in any state, whether higher or lower.

I remember to have described somewhere how we are marvellously built up of earth-materials—*still star-matter*—which the earth never parts with in the slightest degree for any building up in other spheres—nor is it reasonable or necessary that it ever should. For surely that divine material is abundant enough in every star and every planet, without any taking from other. I have said how marvellously we are built up of modifications of shining metals and gem material—very largely of the diamond, or carbon; merely expanded by a divine essence—heat—and variously assimilated; of hydrogen, which in its simple solid condition will prove to be a sort of sapphire gem; giving its blueness to the sky; also expanded into gas by heat; and liquefied in conjunction with oxygen in water; and solidified in the same conjunction in ice. In this conjunction the azure tint is weak and requires depth of transparency to reveal, because there are more than eight parts by weight of oxygen to one of hydrogen; and the latter is not condensed in the ice as carbon is in the diamond. Then there is the oxygen as a considerable material of our structure; which, from its crystallizations appears to be another sort of diamond. We have it in the air, in the vapour of water, in liquid water, and in frozen water. And especially it is the solvent which, acting upon the bases of the alkalies, and upon aluminium, and calcium, and lead, and other bases, and upon silica, gives its solid diamond-like transparency to glass, and pottery glazes. Other materials of the human fabric are

these same alkalies, whose bases—potassium and sodium—are real silvery shining metals ; also iron ; and, largely, calcium, a sort of pale gold, the base of lime ; and other metals ; all oxidized and adapted to their several parts in the divine human structure. Then there are those two mysteries—phosphorus and sulphur, which are largely used, and seem to be very vital elements. I think I am right in declining to regard light-heat-electricity as matter. I have shewn why. But, of course, I know not but that spirit may be a condition divinely derived from matter, although no longer matter when spirit, rushing readily through matter, as these do. Thus I have wondered what is the relationship between electricity and sulphur. Electricity seems to be life ; and sulphur seems to be life in the human fabric, and permeates all living creatures ; and the lightning smells sulphurous. Primitive men observed that fact. Homer, when he describes the hurling of Jove's thunder-bolts at the ship of Ulysses says, more than once "and it was filled with sulphur." This smell of the thunder-storm was universally regarded as of sulphur until electricity became somewhat known ; and then it was said to be not a smell of sulphur, because it was the smell of electricity. Perhaps time will reveal something more to us in this direction.

Thus the human earthly temple-prison, earthly as it is, and decried as it is, and abused as it is, is certainly built up of star-matter ; and most wondrously in all ways ; and is worthy the tenancy of the divine immortal essence. Such materials seem indeed fit for the make of immortal gods and goddesses. And each star and planet holds its ample store for all the purposes of the omnipotence of the Creator—even for the creation of immortal bodies as temples for immortal souls in the final state of Divine Restoration ; if such immortal temples be necessary or desirable for perfected immortal souls ; respecting which we know nothing. At present the material body, including the brain, is not only the temple of the soul, but its prison and fetters ; restraining its action, scene, and scope. What it may be capable of without this prison and fetters, or with a more potential organization of brain to work in—another brain in another life, even an immortal life—we of course cannot tell. But we are justified in expecting much further progress in this direction ; even as there was certainly a time when we certainly were not in human form and excellence on this planet ; yet, at length, here we are, as exalted lords of the old creation. And,

as to the possibilities of winged flight and speed, if that would be an improvement, the materials of the stars are ample ; and He is omnipotent ; and He is Love ; and behold the flight and speed of the myriads dancing and darting in the gilding summer air ; and see how readily He could give winged speed, even the speed of golden and rainbow-tinted wings, to His perfected immortals !

This is all the answer I can give—vague enough, of necessity—to your suggestion respecting the decay of the brain, our present indispensable medium of thought. The decay and dissipation are certain ; and the non-restoration of the identical matter to the same individual immortal is certain. Hence, perhaps, as I have already hinted, the oblivion of the pains and sorrows, and degradations and disgraces of all the past. But yet we look for a Resurrection, or raising up of a new body, which may be composed of similar star-matter ; but more glorious than the old ; still more of a temple and more beautiful, and still less of the restraining prison and fetters. Your suggestion also covers the decay of the brain of the dear little dogs—*their* indispensable medium of thought. For such too are the divine materials of which dear little dogs' heads are made—they who are certainly our kindred co-inheritors of Divine Love, as well as of star-matter temple-prisons.

But they, with all their loving and lovable ways, and dear friendships to man, are not yet ready for the final golden wings. I think not. They are so short of Christian charity ; and, of course, will have to be born yet again without the golden wings. Paddy is very honest and will not, in the house, appropriate anything that is not his ; but will sit up and beg very prettily. But out of doors he seems to claim almost all animated nature as his. He goes in for it from a bull and a bear—really—to a rabbit, a mouse, a cockroach, a blow-fly, and even the wasp. The latter has taught him a lesson, by which Paddy has profitted and the wasp has not. He catches the wasp now very cleverly between his naked teeth. But what I am about to observe is that to his most generous human friend he will not part with a bit of anything that he catches. His mistress Adeline, whom he recognises as "Aunt," loves him very dearly ; and he loves her very dearly. But when they were out for a walk the other day he caught a very small rabbit, and began to eat it on the spot. His mistress stretched forth her hand towards it in play, when he thought

she wanted a bit in earnest, and immediately clapped his paws upon it in a most ungentlemanly manner, and growled seemingly savagely ; and would not let her have a bit. So he will certainly have to be born again before he will be fit for the golden wings. Then there is another dear little dog ; a neighbour and great friend and favourite of Adeline's ; who also loves her dearly, as nearly all dogs do at first sight. The other day she found him engaged over a hideous little pile of horror from the butcher's—some awful offal ; raw too ! As if she would want any of *that* ! But the little dog thought she did when she stretched her familiar hand towards him ; and he instantly exploded in vociferous growls and shrieks, like an inhospitable little bomb-shell ; and wouldn't let her have a bit. Still they are none the less dear little dogs ; and I feel sure that they will be helped to earn their golden wings in due time. If the thought should occur to any one that I am excessively digressive again and again with this subject of little dogs, let me reply that little dogs are the subjects of a vast deal of "Modern Thought," which is half our text.

[P.S.—While finally preparing this letter for the printer I observe in this day's "Daily Telegraph"—4th February, 1895—the following paragraph :

" An instance of sagacity on the part of a dog occurred at Peterborough on Saturday. A boy, aged five years, fell off the north bank into the River Nene, and, before the skaters on the flooded meadows could go to his assistance, a shepherd's dog jumped in and pulled him out."

So the golden wings may not be so very far off after all.

The following is a copy of the leaflet (*) referred to in the foregoing letter. It was the late dear Miss Gordon's, and was highly appreciated and treasured by her :

" PERFECT THROUGH SUFFERING.

" I kept for nearly a year the flask-shaped cocoon of an Emperor Moth. It is very peculiar in its construction. A narrow opening is left in the neck of the flask, through which the perfect insect forces its way, so that a forsaken cocoon is as entire as one still tenanted, no rupture of the interlacing fibres having taken place. The great

* London : S. W. Partridge & Co., 9 Paternoster Row.

disproportion between the means of egress and the size of the imprisoned insect, makes one wonder how the exit is ever accomplished at all, and it never is without great labour and difficulty.

“It is supposed that the pressure to which the moth’s body is subjected in passing through such a narrow opening, is a provision of nature for forcing the juices into the vessels of the wings, these being less developed at the period of emergency from the chrysalis than they are in other insects.

“I happened to witness the first efforts of my imprisoned moth to escape from its long confinement. During a whole morning, from time to time I watched it patiently striving and struggling to get out. It never seemed able to get beyond a certain point, and at last my patience was exhausted.

“Very probably the confining fibres were drier and less elastic than if the cocoon had been left all the winter in its native heather as Nature meant it to be. At all events, I thought I was wiser and more compassionate than its Maker, and I resolved to give it a helping hand. With the point of my scissors I snipped the confining threads to make the exit just a very little easier, and lo ! immediately, and with perfect ease, out crawled my moth, dragging a huge swoollen body and little shrivelled wings. In vain I watched to see that marvellous process of expansion in which these wings silently and swiftly develop before our eyes ; and as I traced the exquisite spots and markings of divers colours, which were all there in miniature, I longed to see these assume their due proportions, and the creature to appear in all its perfect beauty, as it is in truth one of the loveliest of its kind. But I looked in vain. My *false* tenderness had proved its ruin. It never was anything but a stunted abortion, crawling painfully through that brief life, which it should have spent flying through the air on rainbow wings.

“The lesson I learnt that day has often stood me in good stead. . . . I have thought of it often when watching with pitiful eyes, those who were struggling with sorrow, suffering, and distress ; and it has seemed to me that I was more merciful than God, and would fain cut short the discipline, and give deliverance. Short-sighted fool ! How knew I that one of those pangs or groans could be spared ? The far-sighted *perfect* love that seeks the *perfection* of its object, does not weakly shrink from present transient suffering. Our Father’s

love is too true to be weak. Because He loves His children He chastises them, that they may be partakers of His holiness. With this glorious end in view, He spares not for their crying. ‘Made perfect through suffering,’ as the Elder Brother was, the sons of God are trained up to obedience, and brought to glory through much tribulation.”]

LETTER XL.

CYRUS ON LABOUR AND TASK-MASTERS.—SOUL DEVELOPMENT AND STAR-MATTER DEVELOPMENT.—THE MYSTERY OF LIFE—THE GOLDEN SANDS OF RHYL.—THE EMPTY HOUSES OF THE SEA.—ITS ARMIES OF FIERCE WARRIORS.—A ROOK’S FEATHER.—DIVINE DESIGN EVIDENT.—THE WONDERFUL TUBICOLOUS ANNELEIDS, AND THEIR CRYSTAL HOUSES ON THE BEACH.—THE EFFECTIVE ARMS AND ARMOUR OF THE SHRIMP AND PRAWN.—PRINCE KROPOTKIN ON NEBULÆ, AND THE EARTH’S AXIS.—THE NORTH POLE ONCE TORRID.

10 JULY, 1892.



HAVE been further pondering on the subjects of our last two letters, and reading in the third chapter of Xenophon’s *Cyropædia* these words attributed to Cyrus: “The gods themselves have so ordered the course of things; to those who will not impose upon themselves the task of labouring for their own advantage, they give other task-masters.” Here seems to lurk an ancient notion according with the teaching of our Seer, and of Buddha; that for some reason unknown to us this life is mainly a stage of progress through labour and a certain amount of suffering “for our own advantage,” therefore to a better state. Although the path of progress is adorned with much beauty, and its resting places are furnished with many mercifully provided comforts for those who honestly do their laborious duty on the way. But for those who shirk the task of labour and duty there shall be task-masters to drive them. This seems indeed to be a fair explanation of this passage in Xenophon. And I have no doubt it was revealed to Primitive Man with his first knowledge of his duty,

divinely imparted to him when made acquainted with his doom to labour and sorrow. I say "first knowledge of his duty" because we understand nothing of the Genesaic allegory of events preceding that divinely intimated doom.

I have also been further pondering on the probable correspondence of soul development with the star-matter development in the animated creation ; and, consequently, how unlimited such co-development may in the future prove to be in higher worlds or heavens.

Given, first of all, the divinely increased potentiality of the brain, and all the other human organization if necessary ; and the sequential result would be an advance from the same course of progress that we now experience and witness in the growth from babyhood with feeble baby-powers, through childhood and youth, on to manhood and womanhood, and then beyond that at present fixed limit ; with progress or growth of soul or mind corresponding with the new advanced material development. Namely further increase of knowledge, understanding, recollections, wisdom or mental powers, and vigour of life. All apparently immaterial, and not part of the material. Because, as I have observed elsewhere, the life with all its phases will forsake the material machine without taking away a particle of the material with it : even while that machine is still warm with the warmth that was of life ; and with all its protoplasmic structure unimpaired ; and blood still fluid. Thus with a more highly organized material temple or prison, the soul would have correspondingly increased development, or capacity for development. The attainment of the present degree of man's soul-development may have been the only and great object of his incarnation in this life ; and his occupation and rule of this planet ; and his progress may be only possible by certain stages ; of which this is one. We cannot tell ; but all we are able to see and understand points that way. The process of our progress to perfection, and full restoration to immortal Godhood must remain a mystery to our present faculties. But your remark about the inevitable decay and dissipation of *our present medium of thought* has led to this misty attempted peep at that mystery.

I see that Mrs. Jameson, in her book from which I made a quotation in the previous letter, expresses a thought kindred to our own on the subject of the development of the human mind by

education and study, to the utmost of its divinely appointed limited capacity. She writes :

"I have heard it laid down as a principle, that the purpose of education is to fit us for the circumstances in which we are likely to be placed. I deny it absolutely. Even if it could be exactly known (which it cannot) what those circumstances may be, I should still deny it. Education has a far higher object. . . . No ; the true purpose of education is to cherish and unfold the seed of immortality already sown within us ; to develop, to their fullest extent, the capacities of every kind with which God who made us has endowed us. Then we shall be fitted for all circumstances, or know how to fit circumstances to ourselves. Fit us for circumstances ! Base and mechanical ! . . . The human soul, be it man's or woman's, is not, I suppose, an empty bottle, into which you shall pour and cram just what you like, and as you like ; nor a plot of waste soil, in which you shall sow what you like ; but a divine, a living germ planted by an almighty hand, which you may indeed render more or less productive, or train to this or that form—no more."

I have been for several days roaming over the beautiful expansive golden sands of Rhyl and its adjoining coast, gathering shells and other marine productions with which to rejoice the hearts of the little children of neighbours in Cheshire. How could I look upon these scattered things of beauty and wonder without pondering on the subject which we have lately been discussing in these letters—the evidences of Design, beneficent design, in the Creation ? These sands are as a page of gold, all mosaiced with hieroglyphic gems, which all read and tell of "The Power Wisdom and Goodness of God as Manifested in the Creation," so surely and so wonderfully ; although the idea is challenged in "Modern Science and Modern Thought" in favour of a dark unsatisfactory theory of mere self-evolvement—a creation without a Creator.

It is true that these fairy empty houses of the sea seem to have been constructed by their original tenants, each individual having been endowed with its special uniform constructive power, or agency, as a necessary part of its own creation, growth, and full development. And so, to the silly genie of Epsilon in Orion, it seemed to be all sole self-creation. But every individual is without option in the matter, and performs the wonderful agency even without knowledge

of its performance. It is, perhaps, even more correct to call the little marine animal a *means* rather than an agent, in the construction of its house. It is done by a natural secretion in which it has no choice, and of which, as I have said, it has no consciousness ; and yet it is all done by marvellous, exact, uniform, incomprehensible, beautiful rule—which rule we prefer to call the Power Wisdom and Goodness of God. We conclude that this is all so by our own experience. The human child likewise secretes its bones, and teeth, and nails, and hair, without any consciousness of the operation ; therefore it is not self-created, and its natural functions are the mere means of the Creative Power.

And on the sands I picked up two rook's feathers. Why stoop to pick up objects so common as rook's feathers ? Behold in them, and in the structure of the creature which has shed them, the wonderful and beneficent Design of their Designer and Creator ! I send you one of them to examine with a magnifying glass and see and ponder on its perfect fitness to its purpose in the wing of the aerial traveller.

And at the edge of the wave on this coast at low tide there are millions of another very common creature, that little crustacean the shrimp. Behold here also wonderful Design and complete adaptation. Look and see what a perfect man-of-war, or Joan of Arc, he or she is, clad in jointed armour, with spears and spikes and hooks of offence. And a girl with naked feet takes captive whole armies of these warriors at every calm low tide. The Welsh call the edge of the wave *min y don* ; but the shrimp which inhabits it they call a shrimp ; but some of them pronounce it " sherimp." And, indeed, the females of these little warriors are such she-rimps that they completely out-Amazon the Amazons. See in them the evidence of the mystery that their Creator has ordained warriors, war, and victims. And it was ever so ; from the beginning of the creation of the world. Examine their formidable weapons of offence, if you have not already done so—their sharp spikes and their hooked talons, exactly like the talons of a tigress ; quite as formidable in proportion to size. Then look at their defensive armour—real jointed mail from head to tail, terminating in a strong sharp spur ; while its shoulder-pieces are fitted with four strong and remarkably keen spikes. Besides the girl with the naked feet, there are many shrimpers, men women and boys, who go out with dredging-nets at every calm ebb-tide, and on the battle-fields at

the edge of the wave take captive whole armies of these marine soldiers, in spite of all their natural fierceness and arms and armour. And such is their fate, as irresistible as all death, that they may be absorbed into the gods.

And, more wonderful than all else on this beach, there are sprinkled thousands of other empty houses besides the pretty shells—the shells that lie about like leafless plucked-flowers and alighted butterflies on a field of gold. These other empty houses belonged to a family of creatures which used to be called in the old books *Annellidæ tubicola*. I referred to them in "Cloud Hill" page 23, published in May 1881, as evidences of the gentleness of the ocean waves when dealing with gentle things. I was speaking of certain shells which had been found in that sandy Cheshire Plain which is viewed from the summit of Cloud Hill, thus :

" Now as to the shells found in the drift-sand of this plain. Much has been made of the circumstance that they include arctic specimens. Yet the famous fragments found in the Macclesfield Drift really include none but such as have their habitat within the British seas. The *Cyprina Islandica*, *Astarte arctica*, *Astarte elliptica*, and *Trophon clathratum*, may be termed arctic species, but their southern limit extends to the British seas. It is true that some shells which were said by some workmen to have been found in the Drift, were rejected as spurious : those specimens however were not arctic but tropical. Had the attempt been to palm off arctic specimens it might have succeeded, especially had they included the *Pecten Islandicus*. But there is no reason why this solitary shell should not be found in the Drift, somewhere within the British Islands, without afflicting these regions with glacial congealment ; even if it had not at present its habitat in British seas. The ocean is mighty to punish resistance, but, how tender it can be in its treatment of its own fragile shells all know who are familiar with a sandy beach, even after the uproar of a great tempest. The same force which will tear down rocks in their resistance, will land with marvellous gentleness, and push far in-shore without the slightest injury, the most beautiful fragile pearl houses of its fauna, which even the delicate touch of a girl will crumble. Even the wonderfully constructed little crystal palaces of the *Annellidæ tubicola* are thus moved far along by the waves without injury, and there is no reason why so strong a shell as the Comb-shell of Iceland,

should not reach us from the arctic regions, without bringing the arctic regions with it."

I do not mean by this that the site of the Cheshire Plain which I now inhabit was never arctically cold ; but that the evidence of its arctic cold is not in these shells as had been argued, but was probably much earlier than the date of their secretion. I believe that the Cheshire Plain has been actually arctic in position, and that all the present tropical and temperate regions have been arctic in their turns. And I *know* that the present arctic regions were once tropical by the fossil flora and fauna which have been discovered as near to the pole as explorers have reached. Any attempts to shew that they might not have been once tropical have proved unscientific and futile. Such changes of the axis of the earth must inevitably follow the changes in the earth's balance resulting from great upheavals and depressions, such as the elevation of the Himalayas, or the depression of the Atlantic basin ; and must follow whether those events happened slowly or with suddenness ; such ups and downs have been of frequent occurrence all over the surface of the globe. But it is the wonderful houses of the annelids of which I wish to speak. The name *Annellidæ tubicola* has given place to the better expression Tubicolous Annelids, and we will so call them in future.

The tubicolous annelid cases, or houses, of which I now speak are like little fairy bits of true masonry, of which I have never met with any description in any book, although such must exist somewhere. Those of which one reads are also found on this coast, but there is nothing more wonderful about them and their doings than about any other marine creature. Some of them secrete their tubes around them of carbonate of lime, like ordinary shells, and live therein. Others secrete a horny substance instead. Others a glutinous flexible fabric, like a long sack, which becomes coated all over with grains of sand, shell, and anything it may touch, until it is a flexible tube of sand etc., with a lining. There is, of course, no regularity whatever in this sand and shell arrangement as it is merely caught up by accidental contact with a sticky surface. But the annelid of which I speak is a true mason and his work is truly wonderful. I know of no work of any creature, not human, that is so wonderful, seeing that it is not what we should call instinctive *secretive* work. You may be very familiar with these crystal houses ; but, in case you

should not be, I have collected a good many of them to send to you ; many, because they are readily broken in examination ; and, if any of your friends should take any interest whatever in what I am writing, they will take ten times more interest in examining the things for themselves. You will observe that each crystal house is shaped like a cheroot ; "only more so" ! as an Irishman might say, being perfectly circular and perfectly taper. You must examine them with a magnifying glass to realize their beauty. Instead of being the work of instinctive secretion, as I have said, these houses are constructed by positive masonic labour of selection of stones, fitting, mortaring and fixing, in a structure of perfectly circular taper-tube-form. These annelids build the most wonderful rubble-work that I have ever seen, even including human rubble-work. Many years ago I captured some of them living in their cases, off Pensarn near Abergele, and I watched them closely, giving them sand in their vessel of sea-water to build with, but they never shewed me how they did it—never revealed their masonic secret. Their work is so regular as a rule, that if you fix your attention upon any single stone in the masonry, and look around it, that particular stone will be found to be the centre of a rosette of six surrounding petals or pebbles more or less exact. But their work is not always continuously perfect. Like other workers they seem to have their "karma" of merit and demerit, and sometimes an irregular unlawful stone is used, causing the erring builder a great deal of extra trouble in the progress of his work, and throwing out for a space the pretty rosette order of the architect. This error or fault appears to have been the result of idleness, in using an unsuitable stone nearer to hand, when there was plenty of the right sort not far off.

It is a remarkable thing that the rubble-work of the tiniest babies of these annelids is quite as perfect as that of the adults, as you will see. In some cases you will see the early baby-work undetached from the later work, the taper being continuous from babyhood to maturity. As the creature grows it seems to add course upon course of fresh masonry, of course only at the widening end, and then draws itself up, or forward, from the too tight apartment, or end, which narrow end generally gets broken away, being outgrown, empty, and useless. One of the remarkable characteristics of this rubble-work is that, unlike human rubble-work, there is no excessive use of cement,

but about the same as if the stones had been hewn into squares. Of course the cement would be the mason's own shelly secretion. Look at a fragment of a case held up against the light—transmitted light—and you will see why I have called them crystal palaces ; although even erected by a baby annelid, without a moment's training—still a perfect master mason ; perfect in skill, but a little idle occasionally, as I have said, when grown up.

And is there really no creative Design in all these things which are to be seen at the edge of the wave ? In every living thing, and in the instinctive labour of every living thing, and in every dead thing I have always found so much indication of creative Design, that, with all our evolved cleverness, it often takes a great deal of study and time to grasp the fulness of this beneficent forecasting perfection of Design. A rook's feather is a thing common enough to you and to me and to the author of "Modern Science and Modern Thought" ; but its wonderful construction, so adapted to its purposes, and all, of course, preceding its forecasted action, has evidently been overlooked by the latter, or he would never have been content with the conclusion that it was a mere accidental self-evolvement, independent of any creative Design. How could the armed and armoured species ever have survived and become carnivorous warriors if their arms and armour had been the very gradual accidental result of very slow evolution requiring ages upon ages of development ? In speaking of the military design of the shrimp I ought to have said that the warrior I described is the common brown shrimp ; the red or pink animal, which is really a prawn, is differently armed, being furnished with a most formidable sword projecting from the armour of its head, unicorn-wise. It is curved upwards at the point for more effective ripping, and its edges are set with ugly spikes. It is a strong and most effective weapon, and it is impossible to shut one's eyes to its design. I do not at all understand Nature's armed and armoured carnivora, but I am sure it is all part of Creative Wisdom, and expect to understand it in some future state.

I now turn to the "Recent Science" papers by Prince Kropotkin, in last May's "Nineteenth Century" which you so kindly sent to me. The first paper, on astionic nebulae, reads very much like the chapter on the same subject in "Modern Science and Modern Thought" which we have already noticed in these letters. The con-

jectures which I have already dealt with are, some of them, repeated in this paper with no more strength than is derived from mere repetition, which is nil in the case of error. And there is no more strength in the additional conjectures respecting the Pleiades and the nebulæ in Orion. Nor is there any force in the opinion expressed respecting a part of a nebula in Argus, thus :

"At the very same place where Herschel saw one of its brightest and most conspicuous parts, we have now a dark oval space, upon which no trace of luminous matter can be detected. The matter either has been drawn elsewhere, or is luminous no more; may be, it is passing through some stage preparatory to a new star." One would almost think that the mind of such a writer could be "luminous no more" on such a subject. How can it be conceived that a living incipient sun, in receiving its maturity from the condensation of living nebulosity, should find utter extinction "a stage preparatory" to its re-appearance as a new star? Is it possible that the young thing has merely retired to some celestial chamber to get shaved, that it may presently re-appear a neater and more compact glory?

But, further on, where Prince Kropotkin deals with scientific facts instead of baseless theories, his conversation is charming. It is especially interesting to me to learn from him that the changeability of the earth's axis is at length acknowledged. When I wrote on that subject many years ago it was declared impossible by the authorities; but that did not alter my opinion, and later on, in 1881, I repeated the assertion on page 33 of "Cloud Hill," merely quoting from my earlier work "*Arbor Low*," which was published in eight chapters in "*The Reliquary*" of 1876 and 1877, and even then it was an old conviction. It is thus quoted in "Cloud Hill":

"I have had occasion before to refer to the once tropical fauna of the present Arctic regions, right away towards the North Pole, in a question relative to primitive man; and in the second chapter of *Arbor Low*—1876—are these words: 'And it is possible that there was once a traversable route to America besides that of the Atlantic. I have long held that the earth did not always revolve upon an axis at the same angle to the sun's rays as at present. The now frozen north was once torrid, and may have furnished to wandering tribes an easy way to the American continent. Siberia and the arctic regions were once warm fruitful regions, supporting a population of huge elephants, whose habitat was

such a clime as that of India is to-day. The separate discoveries by Gabriel Sarytschew and Ossip Schumachoff of entire bodies of the Mammoth, un mutilated and uncorrupted, imbedded in solid masses of ice, indicate that the change of temperature in the instances of their calamity was sudden. They were overwhelmed with a flood, which froze into a solid mass around them before a bone had been broken, or their flesh had become tainted ; and when disentombed thousands of years later, their flesh was then sound food for dogs.'

"These are evidences of a sudden glacial period, which has, however, remained a glacial period to this day.

"It is not reasonable to argue that the Mammoth of those regions was an arctic animal. The abundance of Ivory scattered throughout the Siberian cemetery favours the idea that the Mammoth population was large ; and for the support of such monsters those regions must have yielded an abundant and *constant* flora for their food. Perpetual warmth and perpetual moisture could alone render possible the exuberant and gigantic flora which supplied the coal-fields, and which must have continued to flourish in new species later on to feed the Mammoth and his fellow creatures at that time and place."

I would not give this quotation if I did not feel that its truth will be helpful to the elucidation of more than one difficulty in anthropography and other branches of science. But when I wrote this, and long after, the change of axis was pronounced impossible by the authorities, without altering my own conviction ; and I therefore repeated the statement in "Cloud Hill" in 1881 only to cause further protests. Now Prince Kropotkin tells us that by means of observations made in 1889 and again in 1891 it appears clear that the axis of the earth is changeable, and not only in its angle to the sun's rays, but that the poles themselves shift in relation to other terrestrial places, changing the meridian.

As I still proceed with these "Recent Science" papers the more value I find in them—much more than in the "Modern Science" chapters, and I thank you for drawing my attention to them. It is gratifying to see in them confirmation of the views I ventured to express to you on electricity, light, and heat. I used to read science papers quite laboriously until I got quite tired of them ; and for a long time past I have never looked at such a thing unless especially requested to do so, and then only as an inflicted task. I am a

geologist but have never read a page of the Geological Journal of which there are 33 volumes in my library, and it is, of course, still current. I am also a Meteorologist, and have the long row of books of the Royal Meteorological Society, of which I am a Fellow, but have never read a page of them. Yet, and you may hint *consequently* am I as much a school-child as ever, ever constantly learning something from the heavens, the air, and the earth ; ever thinking, thinking, thinking ; and shutting my eyes to find out the light, and avoid the distractions of conflicting theories and dreadfully wearisome books. Your scientific industry quite appals me. I finish Prince Kropotkin's bit of science-gossip, however, with high appreciation, and thanks to you.

LETTER XLI.

THE TESTIMONY OF THE ROCKS.—“BEHIND THE VEIL.”—THE PROGRESSIVE LIFE OF DEATH.—DIVINE ECONOMY OF LIFE FROM THE BEGINNING.—CONSTANT TERRESTRIAL PREPARATION FOR PROGRESSIVE LIFE.—THE COMPLEX NECESSARY ELEMENTS OF MAN'S CORNFIELD AND GARDEN.—TENNYSON ON FRUITLESS PRAYER.—THE EARTH A MERE STAGE OF PROGRESSIVE LIFE.—BENEVOLENT DESIGN EVIDENT IN CREATION.—LITTLE CHILDREN CITIZENS OF THE KINGDOM OF HEAVEN.—GOOD AND EVIL.—AGNOSTICISM AND ATHEISM.—POSITIVISM.—MIRACLES.—ENTOMOLOGICAL VISITORS AGAIN.—ONLY SAVED BY ADVERSITY.—MODERN PROGRESS IN CRIME.

31 JULY, 1892.



HAVE been reading a few pages of the “Modern Thought” division of Mr. Laing’s book. The subject appropriately opens with grand melody. Among the fine verses quoted from Tennyson’s *In Memoriam* are these :

“Are God and Nature then at strife,
That Nature lends such evil dreams
So careful of the type she seems,
So careless of the single life ;

" 'So careful of the type?' but no,
From scarped cliff and quarried stone
She cries, 'a thousand types are gone :
I care for nothing, all shall go.' "

The quotation ends with "Behind the veil, behind the veil." And that is just it. The fact that there is an evident veil, gives faith in a something *behind* the veil ; and as life on this side of the veil is so evidently a conditioned blessing, we are reasonably inspired with hope in addition to the faith, that death also, as well as life, will prove a blessing ; or a new birth to a new blessed life when some mysterious conditions shall have been complied with ; which mysterious conditions seem to have been in operation, and therefore probably in course of fulfilment, from the beginning of the creation of the world. I say beginning, because the creation of the world is continuous to this day. These verses seem to be a beautiful lament that all things are subject to decay and death, in the spirit of the lamentation of Buddha. But though all terrestrial life is terminable with death, you and I regard death itself as mere progressive life—the articulation, if it be repeatable, of successive progressive lives ; and it matters not whether that articulation is wrought by carnivorous "Nature red in tooth and claw," which I believe to be a painless articulation, or the gradually increasing slower faintness of the death-bed departure. The fossil remains "from scarped cliff and quarried stone" indicate no waste, but economy ; no absence of design, but evidence of Almighty progressive design. I have already referred somewhere to this interesting geological revelation, and shewn that while the earth has been in course of creation, no time has been lost in fitting to its temporary rudimentary physical condition, a like temporary rudimentary physical condition of life, from the most simple upward. And those early types, suited only to those early times, and so economically fitted to those early times, must have fulfilled some purpose in their day and generation. How presumptuous it would be of us, their successors, to say that their lives are all a waste, and their types all a mistake, because they have fulfilled their terrestrial destiny of their day, and passed on, behind the veil, as we too are passing on !

Let me try to shew more clearly the economy, instead of waste, of the creation of these rudimentary types of life in a rudimentary world,

or planet. When the base of lime was still metallic calcium, as it was in the beginning, the creation of creatures requiring beautiful pearl houses would have been premature. So something else, more simple, if anything, would be created to inhabit the waters and so economise the possible habitat of life while preparation was yet being made for the pearl-house types which were to follow—while the calcium was being oxidized, and the oxide carbonated, and the whole dissolved and diffused in the wide waters, and deposited and blended in all the wide earth, by means of tides and storms and subsidences and upheavals. After that, and then only, this carbonate of lime being available everywhere, creatures appeared with the mysterious and wonderful power of utilizing it to secrete their own most lovely houses. This brings me also to the tubicolous annelids again ; those special masonic annelids, specimens of whose crystal houses I sent to you. They not only needed the lime in the sea water for the secretion of their mortar, but the beautifully smoothed fragments of crystal for their masonry. What would have been the use of *their* advent before the necessary mortar and the masonry were ready for the exercise of their genius ? For there was a time in the early history of the earth when there was no sand, when all the material which is now sand was massive unbroken rock, and the ocean had to prepare this material for the annelid mason, before the day of the annelid mason's advent, and then he appeared, and set to work to build his necessary house. But for the advent of man and his contemporaries, a still greater and more complex preparation had to be made. For him it was necessary that such a blending of materials should have taken place, and all by apparently slow, but sure, merely natural means, that his little cornfield and garden should—and do actually—contain assimilative iron, lime, magnesia, phosphorus, sulphur, potass, soda, fluoride, and other matters ; and his air a certain balance of oxygen, nitrogen, gaseous carbon, and other matters ; and his cloud overhead a certain balance of combined oxygen and hydrogen. All these things, altogether, were human necessities, and man could not be physical man without them. Their complete preparation must precede his advent. But, meantime, other types of life *could* flourish without all this preparation, even while this work of blending was going on ; and the temporary creation of such types, suited to the condition of the earth in their day, was divine economy, not waste ;

economy of time and space in hurrying life of some sort—this mysterious life—across the terrestrial stage, until all this physical drudgery of mixing had been done for the advent of man and his contemporaries. And, humanly speaking, this bringing together and blending the various elements of the earth by means of storms and tides and subsidences and upheavals again and again, all over the surface of the globe, took a long time. And what harmony and design there is apparent in all this now that it is done, and its consequences are apparent in the present life of the globe—in our individual selves ! Yes, indeed, those storms and tides, and those ever recurring subsidences and upheavals, which may have appeared to the angels then merely so much chaos and waste of energy, were really all a divinely wise, beneficent, almighty process of creation ; a progressive blending of the elements *designed* for the bodies of the progressive life which *was* to follow ; and which in due course did follow, and is yet following.

There is really no cause whatever for the lamentation in the *In Memoriam* verses quoted by Mr. Laing, at the beautiful testimony of the rocks, the testimony of the “scarp'd cliff and quarried stone” that “a thousand types are gone.” I have spoken of the earth as the terrestrial stage, and very truly. And because it is a stage, terrestrial death is a *necessity*. We cannot solve the mystery of all this individual life of all types which for thousands of years has been constantly streaming across this stage ; but the brevity of time allotted to all terrestrial life is part of eternal wisdom, or it would not be so. Although we cannot solve the mystery of the enormous and constant succession of life on the earth we can very well understand that as so many individuals of all types had to pass over it, because they have passed over it, terrestrial death, or moving on, is a necessity. For the earth is a limited stage, and for every hundred processionists that there is room for upon it, there are a hundred thousand to pass in irresistible succession. Thus we are all surely, and of necessity, and by the fiat of Almighty Wisdom, on the March. And the material of our terrestrial garments, which took so much creative blending of earth's elements to produce, we leave behind at the end of the terrestrial stage, to be re-cut and re-worn by our successors on the same inevitable March. And it is this fact which Tennyson bemoans in these quoted verses, speaking of man, Nature's last work, still inherit-

ing the ancient death which is attested by the rocks :

“ And he, shall he,

“ Man, her last work, who seem’d so fair,
Such splendid purpose in his eyes,
Who roll’d the psalm to wintry skies,
Who built him fanes of fruitless prayer,

“ Who trusted God was love indeed,
And love Creation’s final law—
Tho’ Nature, red in tooth and claw
With ravine, shriek’d against his creed —

“ Who loved, who suffered countless ills,
Who battled for the True, the Just,
Be blown about the desert dust,
Or seal’d within the iron hills ? ”

O Tennyson, Tennyson, “*fruitless prayer*” ! How know you that ? Surely it is no more true than that Nature shrieks against man’s creed that God is love and love the final law of Creation. Indeed that is not true for that love is the very song that the birds chant to the beneficent sun morning and evening ! The sun, so beneficent that he was worshipped as the God of Love in the very first hymns that men and women chanted in praise and thanks for Good, after they had forgotten the God of the sun. And if the sun be only a *means* of good to man and all living things of earth, as we know now, he is still the means and servant and witness of the God of Love. O Tennyson, look up from your sweet writing, and behold the sun and his doings, and believe this. And again at midnight look up from your sweet verses to the starry heavens, and judge of the constellations by what we know of this our own star—which is only reasonable—and see in all the heavens glorious witnesses that God is Love. And there are clouds of these witnesses that you do not see—infinite witnesses of infinite love. Look and see and believe this until you see “Behind the veil, behind the veil”—your own words, of which also I must speak, for there is a confession in them. You are mistaking terrestrial garments—old clothes that are done with until re-cut and worked up again—for immortal man ! It is only the wear and tear of the clothes that is “blown about [with] the desert

dust”; only thrown off garments that are “sealed within the iron hills”; no more man than are now the nail-parings of his childhood.

While pausing in this writing and still pondering on what we believe to be the progressive life and death-stages of the pilgrimages of souls, my attention is arrested by one of Pope’s verses on the same subject, which he is said to have helped himself to out of Flatman’s poems. This is Flatman’s verse :

“ When on my sick bed I languish,
Full of sorrow, full of anguish—
Fainting, grasping, trembling, crying,
Panting, groaning, speechless, dying.

Surely this represents a death of hopeless terror. But Pope’s verse, on the contrary, so far from being an imitation of that, is this :

Vital spark of heavenly flame,
Quit, O quit this mortal frame ;
Trembling, hoping, lingering, flying—
Oh, the pain, the bliss of dying.

See what mockery is made of the dreaded pain !

The moan seems to be all about death’s physical undoing, which, as I have shewn, is a strict necessity in a planet which is so evidently a stage of temporary action and passage—the passage of a hundred thousand individuals for every hundred which it could contain and maintain permanently. It is curious that those who say they do not believe in any immortality, charge as a blunder, or an evidence that there is no Creator, the non-immortality of physical types of life. To my mind the succession of types and the succession of generations appear more wonderful and divine than would be the creation or existence of one mere earth-ful of earth-retained immortals.

It is the view of the temporary stage of this world as the only abiding place, and of the temporary life here as the only life, and only end of the creation of all things, that leads to the grumble against Heaven, or even utter denial of Heaven and God. And yet we see for a certainty that it is an impossible abiding place for the numbers that march through it. There must be some great reason for this constant grand march-past of the countless generations. It ought to add to our assurance that it must be right, and for the best, when we

reflect that the sun, agent of good to all life, and true sign of divine omnipotent love, has from the beginning been shining upon this constant grand march-past of the countless generations. Viewed thus as a progressive pilgrimage we see that life is a great privilege and blessing, and the path of life wonderfully strewn with beauty and goodness and comforts. Viewed as a final and completed existence —the Buddhist “birth, decay, death ; birth, decay, death” ; it is a disappointment. But the world is truly a mere stage, over which we are passing, passing, passing ; being marched and drilled and licked into better form than in some previous condition, I fully believe, for another more glorious stage.

Tennyson’s expression “fruitless prayer” reminds me of an incident in connection with that thought which may interest you. Two young ladies, who had previously been strangers to each other, met as visitors at the house of a mutual friend. They shared the same bedroom during that visit and became greatly attached to each other. Let us distinguish them as the dark girl and the light girl. The light girl was in the constant habit of kneeling down to silent prayer in her bedroom before seeking sweet sleep ; and was surprised to observe that the dark girl omitted this act of devotion. However, in the morning they became lovingly attached and confidential, and this question of kneeling was discussed. The light girl was then astonished to hear that the lovely dark girl not only never knelt to pray, but never prayed at all. The latter explained that her father was a very very learned scientific man ; so learned indeed that he knew everything ; and beat everybody in every argument. And he taught them that it was no use praying to God ; for all that we attributed to God was the work of Nature. And with this confession the dark girl embraced the light girl, and kissed her fondly, and said :

“Darling, you must not hate me for telling you this ; nor think me hard-hearted and loveless and unnatural and ungrateful in holding these views ! I am indeed all the more loving for holding them ; and adore Nature everywhere—not, however, in the word’s sense of *adoro*, but in the sense of intensely loving her with profound reverence ; and I adore you, dear, as Nature’s very beautiful and very lovable child ; and I would give my life to save yours, dear ! And it is impossible that my dear father can be wrong, because he is so much more learned than any Priest or Bishop or Archbishop or

any Pope ; and defeats everyone in every argument upon this subject."

Yet with all this atheism these words of the lovely dark girl : "I would give my life to save yours, dear !" sound remarkably like that Divine Christian Charity.

The next night the light girl knelt again and prayed. She afterwards explained to her lovely and loving bed-fellow that she had been praying to Nature. "Oh, but that prayer also is fruitless !" replied the dark beauty. "My father explains that Nature is perfectly helpless in the matter, as Nature works entirely by Law, fixed Law, and cannot alter anything, nor attend to any prayers. Every one of her actions is regulated by Law, beautiful and good as she is."

And yet again, on the third night, the light girl knelt and prayed ; and afterwards explained to her lovely dark friend that she had been praying to Law, as the all-powerful. And again her lovely and loving friend assured her that that also was useless and fruitless prayer. For the Law was fixed, and inexorable, and unalterable, and, besides, had no ears whatever !

Then the light girl was staggered. She had got into such a habit of prayer that she could not get out of it. And she was perfectly awed at the idea of that great invincible learning of her lovely and lovable friend's father, which had dethroned her God, and made Nature helpless, and the almighty Law insensible and earless. Their host was a Rector in the Church of England, a dear friend of my own, and the light girl applied to him to inform her what was the derivation and signification of the Word "God." And he told her that it was old Anglo-Saxon, signifying "Good"; and as applied to the Deity signified all that was good in the universe. That was a comfort to the light girl, and brought her back in spite of that awful learning of her lovely and loving friend's father. And she prayed again, ever after, to the Good of all the Universe, trusting that It had ears to hear, and power to bless ; since it was so Great, and Everywhere, as well as so very evidently Good. But O that unanswerable learning of her lovely and loving friend's father ! And when the beautiful light girl mentioned it to me she opened wide those gates of her soul—her dazzling bright eyes, and looked at me with solemn wonder at that learning which dethroned God, and made Nature helpless, and Law insensible and earless—saying: "Oh, he is *so* learned !" as speaking of something of which I could form no conception. Neither can I !

On page 220 Mr Laing writes :

" Not only has faith been shaken in the supernatural as a direct and immediate agent in the phenomena of the worlds of matter and of life, but the demonstration of the 'struggle for life' and 'survival of the fittest' has raised anew, and with vastly augmented force, those questions as to the moral constitution of the universe and the origin of evil, which has so long exercised the highest minds. Is it true that 'love' is 'Creation's final law,' when we find this enormous and apparently prodigal waste of life going on ? "

If life is given only limitedly, as we know all terrestrial life has been limited from the beginning, and ordained for death in an hour or in a hundred years, I fail to see how it can be called wasted when its mysterious end is accomplished, and its limit reached. While we are utterly ignorant of what is "Behind the veil," and have no assured knowledge of the cause and purpose of all passing terrestrial life, it is, in my opinion, positively presumptuous to speak of "waste of life" in Nature's course. If the rule of terrestrial life were immortality, and happy immortality, then the loss of that life in some—its final loss—might seem a waste of life. I have pondered on all this and find myself able to believe that there is a purpose and a purpose accomplished, in all life and in all death, which is, of course, a mystery to me, like all else in the worlds of matter and thought, my own existence included, and I am content to leave it so. This mystery lends no justification whatever to foolish—O how foolish!—doubt of God's wise and all-benevolent Design in the vast Creation. The Founder of Christianity did not seem to think that the death of little children meant waste of life when he said : " For of such is the Kingdom of Heaven." It is possible to study science deeply, and accept all its true teachings, and to be a hater of sacerdotalism, and at the same time to remember with love and reverence these words about the little children—this happy glimpse behind the uplifted veil ! Mr. Laing thinks it is not possible. *I know it is.*

But if there be no waste of life in Nature's own course, I certainly think there is much waste of time in arguing about the origin of Good and Evil—or, say, of Evil. No searching can find that out because it is on the other side of that "veil," whether it be the veil in front of us or the veil behind us. While Evil is subject to the restraint or punishment of Law, it cannot be said to be equally balanced with

Good, as our author claims on page 222.

Again as to so-called waste of life. Take again an instance of the cruel violence of evil directed against the good, even unto death, which yet may not prove evil to the good. We have thought this thought before, but let it be repeated here in its again-appropriate place. The evil man may attack and rob a good man, and dash his head against a rock fatally. Is that violent cruel sudden death necessarily a waste of life? I have said before that the fatal rock may by its shock merely prove to be the gate of Paradise suddenly dashed open for the admission of a redeemed perfected angel, the object of whose terrestrial life is accomplished. And even the evil man may yet in his turn be so marched over the earthly or some other stage, and drilled, and ultimately improved into another pardoned, redeemed, perfected angel. That is the hopeful view I take of life and death, and good and evil, without seeking to understand the origin of these things. Who ever deemed the life of a martyr wasted? Therefore am I never sorry for the dead; not even the darling children, the dear little citizens of the kingdom of heaven; but am sorry only for the living, who naturally mourn them. And I believe that the "red in tooth and claw" ordainment in Nature must be also part of a hidden wise progressive economy—hidden behind the veil. I feel sure it is.

Then as to the expression "Behind the veil, behind the veil," which our author adopts; I said there was a confession in it, which is this: If the veil itself is really discernable, and the poet and our author cannot see behind it, and can only see so very little because of that veil, they must admit that they have no right nor power nor means to judge of God and Creation and Immortality by what little they see and know, and with such unknown possibilities behind that veil. That veil is what you and I so clearly see, hindering our seeing, bounding our near horizon, concealing the infinite; and therefore we reasonably believe that behind it will be found the explanation of all mysteries, and the complete evidences that God is love indeed, besides those evidences which we already have, "and love Creation's final law," even in His ordainment of the life and death of all His creatures.

On page 225 our author claims that Agnosticism "in its highest form" is a very different thing from Atheism. In my acquaintance

with it thus far it seemed to me to be not only bordering upon, but merging into Atheism. Agnosticism itself remains with me thus far the "unknown and unknowable." I think that must be dangerously Atheistic ground which denies God and Immortality. It seems to me very undefined and flabby.

How excellent are Mr. Laing's remarks on Positivism or Comtism. The expansion of the love and charity of a single human heart from mere patriotism to the equal embracement of the entire human race must amount to a dilution of that one heart's love and charity as nearly resembling annihilation as the absorption of a single human soul into the Deity would amount to the annihilation of its individuality.

I have read on to the beginning of Chapter VIII., entitled "Miracles." I shall skip this and the next chapter entitled "Christianity without Miracles." Nothing can shake my faith in Christianity as a practical Divine religion, but I care nothing for doctrinal discussion, so little indeed as to idly pass it all by. Christianity is a miracle in itself Divinely accomplished beyond all argument. So I pass by these two chapters. There is no science in such discussion in the sense of knowledge, and the reality of Christianity will remain after all the discussions, which are labyrinths of opinion made into dogmatisms which I only care for in the sense of detesting them. As to the miracles I will leave them at the same time, regarding all Creation, and the establishment of all natural law, and its maintenance, as one vast and continued eternal miracle of unsearchable Wisdom, Omnipotence, and Love: but though unsearchable to the human mind still very Evident so far as human intellect can reach, right up to the veil, and justifying faith in the same in all that may be "Behind the veil."

Your friend, the Rev. J. White, of Bromley College, Kent, wrote you a review letter in May last on these two chapters, which letter you sent to me. You were kind enough to give me the original, and I will gratefully return you a copy in this, its best place:

"For many days I have been purposing to write to you, and to return you Mr. Laing's book; but as I wished to write at some length this has been put off from day to day. I have not been able to read the book through, but I have read those chapters VIII. and IX. on religion. I am most astonished how any fair-minded and truth-loving

man could have written them. His charge of ‘hopeless contradiction’ is utterly absurd : he confounds it with independent testimony.

“When S. Luke speaks of Mary Magdalen and two others at the Sepulchre, and S. John speaks of Mary only by name, but describes her as saying to the apostles ‘We know not where’ etc., it is not a contradiction, but a far stronger confirmation than any identical enumeration of names and incidents could be. What Mr. Laing seems to require is an identical narrative, which any forger could produce, and which would be by no means so strong an evidence as an independent narrative with seeming discrepancies. What he seems to require would still less convince him than what we have, and would have little right to convince anyone. It is indeed a puzzle how any man can honestly make such statements or urge such objections.

“Discrepancies even real and irreconcilable between independent narratives are by no means inconsistent with their truthfulness or with the reality of what is related. Two remarkable instances of this came under my notice the last few days. In one of the magazines there is an article by Archibald Forbes on the Day of Sedan, (September 2nd, ’70). He was present as War Correspondent, and he says that in going over the various accounts it is impossible to describe exactly what took place. The descriptions of eye-witnesses, even the official accounts of the German staff, are ‘hopelessly contradictory’; not as reflecting—Mr. Laing would I suppose in this case admit—on the truthfulness of the writers in general, or the reality of the events, but as to one being able to reconcile from one stand-point, what appeared to others in many positions.

“The other day I was reading Mr. Whymper’s ascent of Chimborazo. Now he and Humboldt and another eminent traveller, a Frenchman whose name I forget, are in direct contradiction to each other ; and yet they are trained scientific observers, writing about plain facts of measurement, and not of incidents. Now will Mr. Laing say that either Mr. Whymper or Baron von Humboldt are untruthful, or will he cut the knot by saying there is no such mountain as Chimborazo ?

“The difficulties of religion I feel to be very great ; and to have them clearly stated must be a great help to truth. I am one of those who respect the honest denier as well as the honest believer : but it is most sad to see a man who writes so well on scientific subjects—one

able to perceive and eager to find the truth, apparently blinded to recklessness when he comes to deal with religion.

" You may send this letter to Mr. Goss if you like. I am very sorry that I have not had time to read all Mr. Laing's work, as there is very much that is interesting and instructive ; but as a religious guide I think he is worse than worthless."

I have extended this letter to a greater length than I intended, so will now close it. My entomological visitors are here again, a new generation of them, as curious about me and my lamp and my work as were their ancestors last summer. There are two windows to my room, one of them entirely closed, and at that there is a constant faint tapping from the outside, but "no admission" whatever. The other window, facing the east, that through which the Influenza came in last October in the silent night, is closed, all but a narrow slit at the bottom, to keep out the inquisitive crowd. There too they are tap-tap-tapping, and some of them in their persevering search for an opening find out the little slit below, and in they bound, and make a rush at me and my lamp, and perform the aerial dance to the old tune of "Bobbing around, around, around." And some of them singe their finery, and some of them have alighted on the scattered sheets of your letter, and seem to be studying them. I try to save them from the singeing and remove them tenderly outside into their natural nocturnal dimness and safety ; but they resent my protection as an interference with their liberty, and persist in being singed. I have used my hat lightly to catch a big moth without injury to its beautiful feathers, but it seems highly indignant and escapes again and again. They persist in returning to the unnatural light, and injure themselves by it, because it is beyond their understanding. And this is so, right up to man and woman-kind, and is only one of the mysteries which puzzle the philosophers, and which some of them profess to understand in a wrong way of their own. To me this lamp is good : to my uninvited visitors it is evil ; and they will dance round it, which is well enough, but when they dance above it, down they come. Some of them lying prone and motionless I touch with my finger, and they instantly rise up as if startled from a sleep. I have often noticed this and think it must be due to the electricity of my touch. A pretty beetle has just found the open slit and come in with a big buzz, and stumbled clumsily near my writing hand. He looks

very comical with the crumpled ends of his wings hanging out from under his cases like a ragged urchin's shirt at its lower extremities through rents revealed. I am not going to believe that all this beautiful though transitory life, so wonderful in its active mechanism, is without a Divine far-reaching purpose, and all mere waste. But I don't want them here: it is not their proper habitat, and it is dangerous for them. So I will now let them see how they like the perfume of a cigar, and without asking their permission, as they are here uninvited, and have no right to meddle with my lamp and your letter. Most of them will soon go off in a huff, for I know their ways. To them the cigar is evil; to me it is good. To them it is adversity, and only by adversity can they now be saved.

But before I close let me reply to an observation in your last welcome favour. You observe in regard to the dreadful things that are happening all around us, "Perhaps this age is the beginning of an Eon; such fearful things are happening on earth, and in the minds of men."

We seem indeed to have entered upon a new Eon of dishonour, falsehood, and criminal violence. Or rather let us trust that we are thus ending an old one. The prevalence of criminal violence is on all hands and in all lands. Within my recollection it was confidently predicted that the millennium was drawing near. If it be so, it seems to be preceded by a devils' carnival. Indeed it looks as if an extra number of extra bad devils had lately reached their generation of human incarnation; and instead of reducing their extra heavy karmas of demerit, they are seriously adding to them. The crime of the day is another Hydra with more heads, and more hideous, and more vigorously rampant than the monster slain by Hercules. And it has been nurtured by what has been falsely regarded as Progress and Liberty. What will be the next step of Progress? Then look at the Liberty, which has gone hand in hand with the Progress. It is the Liberty of this Progress. The Liberty to oppress and even to murder. Not only the liberty of the employed to oppress employers and the general public, but to oppress fellow workmen—even a minority of labourers to oppress and coerce a majority of labourers. That is the liberty that is claimed now. Fancy this liberty operating so as to prevent a working man, who is strong and industrious, from exercising his strength and industry as he may like, to improve his position, and

honestly lift himself into a higher social sphere. Fancy his being prevented by Law, in the name of Liberty, from exercising his right. Do the men of Liberty and Progress who propose this law mean that the strong and industrious man thus prohibited from full work shall never improve his position? Certainly not. That is farthest from their meaning; because they are restraining themselves from this honest work at the same time; and fully intend with more leisure to have more pleasure; and, with more time, more money to spend in the pleasure. They mean that the strong and industrious man who is willing to obey contentedly the divine ordainment to win bread by the sweat of his brow, must wait a little while, only a very little while, for a little more Progress; and then he shall improve his position by robbery, instead of honest industry. This is the new Eon dawning upon us, if it be not the spasmodic close of an old one. For no amount of combination and organization among men will enable them to shirk or reverse the Divine doom —“In the sweat of thy face shalt thou eat bread.”

If this bit of Review of Criminal Modern Thought seem violent, I trust it will not seem too violent; any more than the guillotine can be too violent for the Ravachols; or the gallows for the Deemings and Neills and Rippers; or the crack of the rifle for the murdering Strikers and Train-robbers of America.

LETTER XLII.

WHAT IS AGNOSTICISM?—THE AGNOSTIC AUTHOR OF “MODERN SCIENCE AND MODERN THOUGHT” IS A TRUE CHRISTIAN.—ST. PAUL ON CHRISTIAN CHARITY.—MIRACLES.—CHRISTIANITY ITSELF A MIRACLE.—BELIEF AND DISBELIEF.—NAPOLEON THE GREAT ON HIS DEATH-BED.—PARABLES.—EARLY PROPHECIES FULFILLED.—REDEMPTION.—THE LAW OF NATURE IS PROGRESS AND NOT HAPPINESS.—THE PILGRIM’S PROGRESS AND THE RAKE’S PROGRESS.—THE LAND OF BEULAH.

14 AUGUST, 1892.



I wonder that we have not been able to define Agnosticism. I now believe it to be utterly undefinable. The author of “Modern Science and Modern Thought” speaks of it as being “in its highest form” very different

to Atheism. We have seen it in another form, however, in another work, rabidly atheistic. We have also seen it deriding Christianity and its Divine Founder in carefully selected sentences of the vilest contumely. And now we shall see it claiming to be good practical Christianity. I think I was right in suggesting that an "ism" which can be coolly, boldly and loudly blasphemous against God, Christ, and Christianity, and claim "in its highest form" to treat the same with profound reverence, is itself, in such a range, a self-contradiction, and self-annulment ; and itself "unknown and unknowable" nonsense. The nearest definition in answer to the question "What is Agnosticism?" will be, I think, "I don't know"—with its double application.

To you this is no news, as you have read through both "Modern Science and Modern Thought," and the other literature of which I now speak. But I have only now, since posting to you my last review-letter, come to sentences in "Modern Thought" which prove that its author, claiming to be an Agnostic, is at the same time avowedly a good practical Christian. By "practical" I mean that if he be not altogether a Christian in his Faith, he is in his Charity ; and that I regard as the best part of Christianity, counting, as I do, the true Buddhist as a true Christian, although he had never heard of Christ.

No wonder that I have been perplexed thus far to make out what Agnosticism is, when it reaches as high as good practical Christianity and Theism, and yet as low as Atheism, and the lowest contumelious blasphemy. Impossible !

Since posting my last letter I have cursorily glanced at some of the "Miracle" pages, which I promised to skip, and shall skip in regard to the miracle discussion. I don't care for that ; but I love the Charity. And so does Mr. Laing. On page 244 he refers to "the passage in St. Paul's Epistle to the Corinthians, in which he enumerates the principal Christian gifts, and assigns, as it were, their comparative order and the number of marks that should be given to each in a competitive examination." . . . "And he goes on to say, in words that come home to every heart in all centuries, that all those things are worthless as compared with that true Christian charity which 'suffereth long, and is kind ; envieth not ; vaunteth not itself, is not puffed up, doth not behave itself unseemly, seeketh not her own, is not easily provoked, thinketh no evil ; rejoiceth not in iniquity, but rejoiceth in the truth ; beareth all things, believeth all

things, hopeth all things, endureth all things.'"

It seems to me that a heartful of this charity, even with all the other Christian gifts left out, ought to greatly help to make the man or woman possessing it very good-looking. It shines in the countenance. And Mr. Laing continues :

"This is the true spirit of modern thought, which, when the externals of religion fail, strives to look below them at its essence, and to retain what is eternally true and beautiful as the ideal of a spiritual, and the guide of a practical life." Is not all this the appreciation and comment of a true Christian ?

Then, in his raid against miracles see how tenderly he approaches the Christian structure of them, although still with the intention of trying to gently topple the whole pile of them to the ground :

"The question of Christian miracles, however, rests on a different and more serious ground. They have been accepted for ages as the foundation and proof of a religion which has been for nineteen centuries that of the highest civilisation and purest morality, and for this reason alone they deserve the most reverent treatment and the most careful consideration."

Here is another tender passage on page 218. Speaking of Renan he says :

"Like Carlyle, the turn of his mind was not scientific, and while denying miracles he remained keenly appreciative of all that was beautiful and poetical in the life and teaching of Jesus, which he has brought more vividly before the world in his writings than had ever been done by orthodox commentators."

On pages 270 and following there is this confession of faith in Jesus :

"We lose the miracles, but in compensation we get what may be considered fresh and lively narratives of the life and conversation of Jesus, and confirmation both of His being an historical personage, and of the many anecdotes and sayings which depict His character, and bring Him before us as He really lived. The mythical theory cannot stand which found in every saying and action an *ex post facto* attempt to show that He fulfilled prophecies and realised Messianic expectations. We can see Him walking through the fields on a Sunday afternoon with His disciples, plucking ears of corn, and rebuking the Pharisees for their puritanical adherence to the letter of the obser-

vance of the Sabbath ; we can see Him taking little children in His arms, and talking familiarly at the well with the woman of Samaria ; we can hear Him preaching the Sermon on the Mount, and dropping parables from His mouth like precious pearls of instruction in love, charity, and all Christian virtues. We can sympathise with the agony in the garden as with a real scene, and hear the despairing cry, ‘ My God, my God, why hast thou forsaken me ? ’

“ It seems to me that faith in the reality of scenes like these is worth a good deal of faith in the metaphysical conundrums of the Athanasian Creed,” etc.

I like this. Our pages are being adorned. I am glad that I glanced among the skipped “ Miracles.” Here indeed is the Charity of Christianity, and also the Faith in its moral miracles ! Here again is another lovely bit of expression, even of Hope, Faith, and Charity, all perfectly Christian. See page 275 :

“ The Sermon on the Mount, and St. Paul’s description of Christian charity, carry their own proof with them, and such parables as that of the Good Samaritan require no support, either from historical evidence or from supernatural signs, to come home to every heart whether in the first or the nineteenth century. The fact that the son of a Jewish mechanic, born in a small town of an obscure province, without any special aid from position, education, or other outward circumstance, succeeded, by the sheer force of the purity and loveliness of his life and teaching, in captivating all hearts and founding a religion which for nineteen centuries has been the main civilising influence of the world and the faith of its noblest men and noblest races ; this fact, I say, is of itself so admirable and wonderful as not to require the aid of vulgar miracles and metaphysical puzzles in order to be recognised as worthy of the highest reverence. And when such a life was crowned by a death which remains the highest type of what is noblest in man, self-sacrifice in the cause of truth and for the good of others, we may well call it divine, and not quarrel with any language or any forms of worship which tend to keep it in view and hold it up to the world as an inducement to a higher life.”

Most nobly and most eloquently spoken ! and I will not argue about the miracles—but still skip them—further than to say that “ so admirable and wonderful ” is Christianity, that the miracles ascribed to it are not more wonderful, nor less credible ; and we must re-

member that the miracles were ascribed to its inception at its inception, when its own great miracle was altogether unaccomplished, and it had not yet become "the main civilising influence of the world and the faith of its noblest men and noblest races." Still, on such a question let everyone think as he will, or can. The Christian Faith, Hope, and Charity avowed by the author of "Modern Science and Modern Thought" are no less lovely and refreshing because he finds himself unable to accept the miracles. Belief and disbelief are neither of them at the command of mere will. Napoleon the Great when on his death-bed at St. Helena on the third of May 1821, confessed to his confessor the Abbé Vignali, "I am neither philosopher nor physician, but I believe in God, and am of the religion of my fathers. Everyone cannot be an atheist who pleases. I was born a catholic, and wish to fulfil the duties that church imposes, and to receive the consolations it administers."

In glancing still onward through these Miracle chapters one is increasingly struck with the increasing charm of the gentleness with which the author treats what he himself considers are old falsehoods. He makes the very best that he conscientiously can of them, and treats them with the respect due to their harmless career and venerable old age—I am now speaking from his point of view and thought. On page 280, after having shewn his reasons for disbelieving the miracles, he writes :

"What follows? Must we reject these venerable traditions as old wives' fables? I answer, No; but we must accept them as parables.

"A great deal of the best teaching of the New Testament is conveyed in the form of parables. Take for instance that of Lazarus and Dives. No one supposes that this is an historical narrative; that this particular Jew, out of the millions of poor and good Jews who have lived and died, was actually taken up into Abraham's bosom; and that the remarkable dialogue across the gulph is a literal transcript of an actual conversation. But the moral is taught for all time, that it is bad for the rich to indulge in selfish luxury and take no thought of the mass of poverty and misery weltering around them; and that the condition of the poorest of the poor, borne with piety and resignation, may really be better and higher than that of the selfish rich. Apply the same principle to the dogma of the fall and redemption, and we may see in it a parable of the highest meaning. Every one of us

must be conscious of having fallen by yielding to temptation and giving way to animal passions. We may have fallen so low that without some redemption, or friendly influence from without, we cannot raise ourselves from the lower level and regain our lost place. We can see that there are thousands around us, who, from poverty or other adverse circumstances, have got immersed in evil conditions from which it is hopeless to extricate themselves without some friendly aid. We can see also that there is nothing more noble and divine than to make sacrifices in order to be the redeemer who saves as many souls as possible from this entanglement of evil, and gives them a chance of rising into a happier and better life. We may feel this, and use as an incentive to attempt some humble imitation of it, the parable which presents it to us in its highest aspect, and has been the efficient means of stimulating so many good men to do good works. This is surely better than paltering with the truth, and enervating our conscience and intelligence by professing to believe in the literal historical accuracy of things which have become incredible to all thinking and educated minds. Of course I do not mean that these dogmas and miraculous narratives were intended by the original writers to be parables, but only that they have become so to us ; and the alternative lies between rejecting them altogether or accepting them as having an allegorical meaning or latent truth."

I still intend to skip the miracles : but may I just ask, If these dogmas and miraculous narratives were not intended by the original writers to be parables, but were written as mere baseless inventions to deceive mankind, and yet have become precious parables, teaching "noble and divine" acts and lives to mankind, and so fitting, during and after the lapse of many centuries, the progressive and most exalted conditions of man thus far, have they not themselves become wonderful miracles of good out of evil ? As much miraculous, for instance, as the promise "In thy seed shall all the nations of the earth be blessed," when for many many centuries no one could imagine how the event was to come off ; seeing that the Jews were a very unimportant people among the nations of the earth ; and most of their time in a state of subjection to some stronger nation ; and anything but a blessing ; and very much disposed to stay at home unless carried away by some stronger nation. That long-recorded promise seemed to lie dead and meaningless for many centuries, until nearly

twenty centuries ago it began to be slowly fulfilled. And its fulfilment from slow is now on the quick march ; and is clearly itself a vast miracle, miraculously promised and foretold ; and, I believe, hailed with songs of miraculous angels at its dawn ; as the devas are said to have sung at the birth of Buddha—another miracle of Divine Love and Goodwill to men. And I feel justified in not accepting Mr. Laing's statement on page 270—"The mythical theory cannot stand which found in every saying and action an *ex post facto* attempt to show that He fulfilled prophecies and realised Messianic expectations."

But I have not made the long quotation that I might ask this question. I made it to shew in Mr. Laing's own very beautiful way and words, that there is even a present human proneness to fall by yielding to temptation, and the consequent constant need of a redemption, or external friendly "lift." And that it seems to me at the same time to lead back the mind from the mere parabolic character, which he ascribes to the Scriptural Fall and Redemption, to a sense of the reality of some great mysterious Fall of a past existence, which is hidden from us behind the hinder veil ; and to a sense of a course of Divine Redemption, which is the explanation of the mystery of the trials and unsettled progressiveness of this life ; the consummation of which redemption will be behind the veil in front. And in connection with this we have on page 282 these important words :

"The law of Nature is progress and not happiness."

This is a wise utterance. We know how true it is that the law of life is not settled happiness, but a well appointed march, and that all things move on. Progress is evidently the end and purpose of our terrestrial residence. Progress to what ? If merely to old age and death—a mere repetition of "birth, decay, death ; birth, decay, death ;" seeing that temporary life is far from a condition of complete happiness, although, as a journey, provided with many comforts—then all the wonderful creation would seem to be an act and condition of purposeless folly. Surely life is a blessing and not a curse, or there would not be ordained and provided for it all the happiness which is mixed up with its many trials. The ordainment of life and its progress is evidently that of Divine Almighty Beneficence. It is progress to something at present hidden from us ; and something surely good, because of the journey's attendant blessings. Surely it must be

progress to that complete Redemption of which we have just been speaking! As happiness is not to be the accomplished end of this life, the progress of this life must be to something behind the veil—a progress to increasing capability and realization of higher and higher, more and more, happiness. Progress and incompletely completed happiness, is quite consistent with progress to completed happiness, across and beyond the earthly stage.

Of course besides the onward pilgrim's progress there is the Rake's Progress, which means progress in retrogression ; easy down-hill life to the careless ones. But that ground will all have to be re-trodden uphill, with increased toils and trials and purging sorrows. And the increased toils and trials, and purging sorrows, will all be healing mercies, although seeming evils.

The Christian Pilgrim's Progress has been wonderfully and divinely allegorized by John Bunyan. There we see the interesting progress with its hindrances and toils and trials and battles, relieved and comforted with much rest and good and happiness on the way ; and nearly the whole way sweetened, besides, with love and loyalty and assured expectation of the Eternal City. Now we know that these comforts of the progress are real and many ; yet Mr. Laing is certainly right, and the law of this life is progress ; rather than happiness in this life.

You probably remember what comforts and joys Christian the Pilgrim experienced before reaching the Eternal City. There was the Pleasant arbour on the hill-side ; the happy hospitality of the palace called Beautiful, built by the Lord of the Hill for the entertainment of pilgrims ; there were the pleasant companionships of Faithful and of Evangelist and of Hopeful, very great comforts indeed ; the pleasant journey through the Delectable Mountains with their gardens, orchards, vineyards, and fountains, and friendly shepherds, and hospitable tents. And after many trials the country of Beulah is reached ; the land which is only divided from the country of complete redemption by a river. This is Buddha's Nirvana in this life ; the battle of life being actually over, the victory completed, and the "karma" already wiped out. And now faith has grown into actual sight, and from this land the celestial city is visible and real, seen beyond the river of death. Here the air is very sweet and pleasant, and in it "they heard, continually, the singing of birds, and saw every

day the flowers appear on the earth, and heard the voice of the turtle in the land." And "in this land the shining ones commonly walked, because it was upon the borders of Heaven." And here again there were orchards and vineyards and gardens whose gates opened to the highway. And they were planted by the King for the solace of pilgrims. "And here they tarried and slept." And they talked in their sleep, because it was the nature of the fruit of those vineyards "to go down so sweetly as to cause the lips of them that are asleep to speak."

And in this land of Beulah the shining ones conversed with the pilgrims, Christian and Hopeful, about the "difficulties and dangers, and comforts and pleasures" of their progress.

So it seems to me that a great Fall in some previous existence, mystery as it is now ; and a great Redemption in course of accomplishment, mystery of love as that is now ; will alone, as realities, and not indeed as a parable of precept, account for all that we know, see, and experience of good and evil ; sorrow and happiness ; birth, trials, and developments ; the constant march-past of all life, and the apparent waste of all life, especially early waste, which latter may really mean shorter stages instead of longer ; as with the children who are of the kingdom of heaven.

But it does not seem to me any argument against all this that none of the departed ever return, to tell those who do not believe it, that which they would not believe if told it ; but would call the visitor a vision, and the communication a delusion. And why should they be expected to return and tell us anything, even we who would believe them, and believe without them, when they are either on the inexorable march to, or are already at, the goal of Redemption ? Let us follow them instead.

LETTER XLIII.

THE LAND OF BEULAH, OR NIRVANA ON EARTH.—THE MYSTERY OF TRIALS.—CHRISTIANA AND HER PROGRESS.—MERCY'S DREAM.—FATHER HONEST.—THE INVINCIBLE CHRISTIAN.—THE CONQUEROR OF DEATH.—MR. FEARING.—MR. FEEBLE-MIND.—THE COMFORTS OF THE PILGRIMAGE.—THE SONS AND DAUGHTERS

OF GOD.—THE SON OF GOD.—CHRISTIAN-PAGAN RITES.—AVEN ROSCH THE ARABIAN.—USE NOT VAIN REPETITIONS AS THE HEATHEN DO.—THE LORD'S MORNING PRAYER.—THE SCHOOL-BOY AND THE APPLE.

21 AUGUST, 1892.



HE last review-letter closed with the words : "Let us follow them instead." Yes ; even as Christiana followed her pilgrim husband ; who did not return from across the river to tell her anything of the Celestial Country. It should be enough for those who are left behind to see how the Christian pilgrims live in the Land of Beulah, or Nirvana on earth, before crossing the river ; when they have won the victory, and drawn near the end of the pilgrimage, and have the Eternal City actually in sight : and to see them crossing the river, for this those who are left behind are privileged to see ; and it ought to inspire them with faith, if they had no faith before, and are only willing to believe in the pilgrim's progress to redemption.

Thus it was with Christiana in the second part of Bunyan's allegory. She realized the effects of some past mysterious fall, needing redemption ; and that the Christian pilgrimage led to redemption. And she found the path of the pilgrimage most mercifully provided with blessings and comforts ; evincing a very Divine Care in the matter ; and the trials of the way were mercifully proportioned and lightened and adapted to her womanly strength or weakness. Unbelievers say : Why not dispense with the trials altogether, and let the poor woman go scot-free ? I don't know why not. There is the mystery. There is the mysterious "karma" somehow to be sponged out, and the law is that there must be *some* self-work and self-help in the matter ; which, after all, is the mere act of willingness to accept the redemption offered ; for it is made very mercifully easy, and reachable to the feeblest who only determine to lay hold of it. But they must do the journey and resist temptations.

At the very start from the Gate Christiana begins to be assailed by temptation ; and has only to cry out in resistance to it when a Reliever comes to her deliverance ; and then shews her how she can have a protecting guide through all the journey if she will only ask the Lord of the Way to grant her one. She would go back at once

to make the petition, but he says : " To go back you need not : for in all places where you shall come, you will find no want at all ; for at every one of my Lord's Lodgings, which he has prepared for the reception of his pilgrims there is sufficient to furnish them against all attempts whatever. But, as I said, he will be enquired of by them, to do it for them. And it is a poor thing that is not worth asking for."

And as her husband did before, so Christiana, and her fellow-pilgrim Mercy, and the children, also found all the way provided with comforts and deliverances ; and they are hospitably and profitably entertained at the house of the Interpreter ; where their future protecting guide, Great-heart, joins them, well armed. Thence they proceed to the palace called Beautiful and have the warmest welcome and entertainment. And there, when they had retired to rest, on the first night, they heard music of rejoicing that they, the pilgrims, had arrived ; and Mercy exclaims :

" 'Wonderful ! music in the house, music in the heart, and music also in Heaven, for joy that we are here.' "

And truly this work of redemption appears to have been a very Divine Care, and worthily the theme of music in Heaven !

And in the morning when they awoke Christiana said to Mercy :

" 'What was the matter that you did laugh in your sleep in the night ? I suppose you were in a dream.'

" 'So I was ; and a sweet dream it was ; but are you sure I laughed ?'

" 'Yes, you laughed heartily ; but prithee, Mercy, tell me thy dream.'

" 'I was dreaming that I sat all alone in a solitary place, and was bemoaning the hardness of my heart. Now I had not sat there long, but methought I looked up, and saw one coming with wings towards me. So he came directly to me, and said, Mercy, what aileth thee ? Now when he heard me make my complaint, he said, Peace be to thee : he also wiped mine eyes and clad me in silver and gold. He put a chain upon my neck, and ear-rings in my ears, and a beautiful crown upon my head. Then he took me by the hand, and said, Mercy, come after me. So he went up, and I followed, till we came at a Golden Gate. Then he knocked : and when they within had opened, the man went in, and I followed him up to a throne, upon which one sat, and he said to me, Welcome, Daughter. The place looked bright and twinkling, like the stars, or rather like the sun, and I thought that I saw your husband there : so I awoke from my dream.'

But did I laugh ?'

" 'Laugh ! ay, and well you might, to see yourself so well.' " Etc.

And after a long, refreshing, happy stay at this place of rest for pilgrims, they proceed on their way, and, in time, overtake a pilgrim who becomes a pleasant companion. I spoke before of the joys and blessings of happy companionships in the pilgrimage. In your last letter you refer again to the theory of final Absorption, and express the hope that you may not thus lose your future individuality. Never fear it. That would be the annihilation of all ties and companionships. It seems to me altogether too undivine and impossible a sequence to the distinct individualities of crowded creation. It would be the extinction of Love. It is not worth a thought. But your reference to it, and this blessed companionship of the pilgrims put it into my head again. The Divine process seems to be just the reverse of Absorption into one Divine Whole, and to be a process of division into divine individualities. All thought conspires against the thought of Absorption.

And thus the pilgrims found a new companion :

" Now a little before them stood an oak ; and under it, when they came to it, they found an old pilgrim fast asleep : they knew he was a pilgrim by his clothes, staff, and girdle. So the guide, Mr. Great-heart, awaked him ; and the old gentleman, as he lift up his eyes, cried out, 'What's the matter? Who are you? And what is your business here?' "

To which Great-heart replies : " 'Come, man, be not so hot; here are none but friends' : yet the old man gets up, and stands upon his guard, and will know of them what they were. Then said the guide, ' My name is Great-heart: I am the guide of these pilgrims, which are going to the Celestial Country.'

" Then said Mr. Honest, ' I cry your mercy ; I feared you had been of the company of those that some time ago did rob Little-Faith of his money ; but now I look better about me, I perceive you are honester people.' " To which Great-heart replied :

" 'Why, what would or could you have done, or have helped yourself, if we indeed had been of that company ?'

" 'Done ! why I would have fought as long as breath had been in me ; and had I so done, I am sure you could never have given me the worst on't ; for a Christian can never be overcome, unless he should yield of himself.'

" 'Well said, father Honest,' quoth the guide ; ' for by this I know

thou art a cock of the right kind, for thou hast said the truth.'"

Yes, this is a very great truth, and a wonderful Providence in Nature's law of progress to redemption—that law which Mr. Laing claims to be progress rather than happiness ; and which I am endeavouring to shew is certainly progress first, but progress attended with much happiness, and evincing so clearly a Beneficent Providence in the law and its operation. It is certainly true that a Christian can never be overcome unless he should yield of himself, in the progress of his pilgrimage. And this, of course, applies also to that true Christian the true Buddhist, and all other such Christians of every creed.

It is no mere theory, but has been experienced very generally, and has been observed and recorded by the noblest and most trustworthy of mankind, during thousands of years, that steadfast virtue is ever somehow aided and protected, even in the physically feeble, against the evil strong ; and thus progress is assured, and Nature's law of progress enforced. Nature's institution of the carnivora has nothing to do with this matter. The martyrs who were devoured by lions were conquerors in their death, by their death, of death.

Bunyan refers to the adaptation of the trials to the strength of the pilgrim in several parts of his allegory. For instance, Great-heart is telling his party of one Mr. Fearing, whom he had had in charge to guide to the river ; and Mr. Fearing, being a feeble Christian, though ever firm in his determination to go forward, gave him a deal of trouble. And Great-heart says :

"' But when he was come to the entrance of the Valley of the Shadow of Death, I thought I should have lost my man, not for that he had an inclination to go back, that he always abhorred ; but he was ready to die for fear. 'Oh ! the hobgoblins will have me, the hobgoblins will have me !' cried he ; and I could not beat him out on't. He made such a noise, and such an outcry here, that had they but heard him, 'twas enough to encourage them to come and fall upon us. But this I took very great notice of, that this Valley was as quiet when he went through it, as ever I knew it before or since. I suppose those enemies here had now a special check from our Lord, and a command not to meddle until Mr. Fearing was passed over.''" . . .

"' But when he was come at the river where there was no bridge,

there again he was in a heavy case: Now, now, he said, he should be drowned for ever, and so never see that face with comfort, that he had come so many miles to behold. Here also I took notice of what was very remarkable. The water of that river was lower at this time than ever I saw it in all my life: so he went over at last, not much above wet-shod.' " Then, you will remember, there was another pilgrim of this sort, named Feeble-mind, who was rescued from the giant Slay-good by the guide Great-heart. And this Feeble-mind, in subsequently relating his adventures says:

" 'When I came at the gate that is at the head of the way, the Lord of that place did entertain me freely; neither objected he against my weakly looks, nor against my feeble mind; but gave me such things as were necessary for my journey, and bid me hope to the end. When I came to the house of the interpreter, I received much kindness there, and because the hill Difficulty was judged too hard for me, I was carried up that by one of his servants. Indeed I have found much relief from pilgrims, though none was willing to go softly as I am forced to do; yet still as they came on, they bid me be of good cheer, and said that it was the will of their Lord, that comfort should be given to the feeble-minded; and so went on their own pace. When I was come to Assault-lane, then this Giant met with me, and bid me prepare for an encounter; but alas! feeble one that I was, I had more need of a cordial: so he came up and took me. I conceived he should not kill me: also when he had got me into his den, since I went not with him willingly, I believed I should come out alive again: for I have heard that not any pilgrim, that is taken captive by violent hands, if he keeps heart-whole towards his master, is, by the laws of Providence, to die by the hand of the enemy. Robbed I looked to be, and robbed to be sure I am: but I am, as you see, escaped with life, for the which I thank my King as author, and you as the means. Other blunts I also look for; but this I have resolved, to wit, to run when I can, to go when I cannot run, and to creep when I cannot go. As to the main, I thank him that loved me, I am fixed; my way is before me; my mind is beyond the river that has no bridge, though I am, as you see, but of a *feeble-mind.*' "

Now these things are not all mere romance. The joys, comforts, helps and deliverances mixed with the toils and trials and assured sorrows of life's pilgrimage are real to everybody. And those who

think that the law of life is earthly happiness are very young ; and will find out with Mr. Laing that the law is progress above all things. No ; these things which I have been quoting are not romance, but allegorized experience ; and the progress to redemption is scarcely less an experience, seeing that it lands one in the Country of Beulah, or Nirvana, which is even on this side of the river, and is a reality of joy in this life. And to those who have reached the Nirvana on earth, with its assured and *felt* full redemption, that and the fall from which they have been enabled to re-climb are certainly *more* than a parable of precept. And between the two—the fall and the redemption—is that progress which Mr. Laing has discovered to be the law of Nature, and all the world is the stage thereof. I use the word Nature in the sense of all things cosmic, seen and felt, and the Power producing all things. And such a progress can only be the result of the ordinance of an Omnipotent Divine Providence : and all the provided comforts and helps and deliverances so freely provided are clear evidences that it is also a Beneficent Divine Providence. If this be not so my correct name is Bat's-eyes, the name of one of Bunyan's characters whose sight was defective.

With the most extensive possible idea, most extensive but not infinite idea, of an infinite non-anthropomorphous Deity, I do not see why any thinker should object to regard the Founder of Christianity as the Son of God. He emphatically proclaimed Himself the Son of Man ; but do we not all claim to be the sons and daughters of God ? How much more emphatically then was He *the* Son of God, who, to use Mr. Laing's own beautiful lovable words “succeeded, by the sheer force of the purity and loveliness of his life and teaching, in captivating all hearts and founding a religion which for nineteen centuries has been the main civilising influence of the world and the faith of its noblest men and noblest races ; this fact, I say, is of itself so admirable and wonderful as not to require the aid of vulgar miracles and metaphysical puzzles in order to be recognised as worthy of the highest reverence. And when such a life was crowned by a death which remains the highest type of what is noblest in man, self-sacrifice in the cause of truth and for the good of others, we may well call it divine,” etc.

This Son of God who sacrificed Himself so divinely for humanity was certainly a human Divinity. Why deny a part in the mystery of

the redemption—whatever the word may include—a part in it, to this divinely human sacrifice, an accepted divinely human sacrifice, with a meaning beyond our full comprehension now? Who can tell how much of the mysterious “*karma*” this noble sacrifice wiped out? Still, I shall skip the miracles, reasoning, as you see, without them, and not as an orthodox Christian, whatever I may think and feel of orthodox Christian faith—reasoning as one only can with one who at the start entirely rejects the miracles, and will listen to nothing but what is logical and philosophical, and altogether outside the mere faith of a Christian.

I am sure you and I both heartily agree with our author in throwing overboard the Athanasian Creed, and in his statement on page 285 of his book, that “We may read the Athanasian Creed less, but we practise Christian Charity more, in the present than in any former age.”

And here is another passage on page 287 which will receive our hearty accord :

“There is next to no theology in the Christianity of the Synoptic Gospels, which give us by far the nearest and most authentic record of what its Founder actually taught ; and it may be that in sloughing off the mythical legends and metaphysical dogmas which have grown up around it, we shall be, in reality, not banishing the Christian religion from the world, but making it revert to its more simple and spiritual ancestral type, in which form all that is really valuable in its pure and elevated morality may be incorporated more readily with practical life, and assimilated without difficulty with the progressive evolution of modern thought and science.”

How unlike anything Agnostic that we have yet met with are the above words : “More simple and *spiritual* ancestral type.”

Without touching on any of the New Testament legends and dogmas we may indeed echo Mr. Laing’s words in regard to “the mythical legends and metaphysical dogmas which have grown up around” professed Christianity, utterly unauthorized by the New Testament ; forms and ceremonies in imitation of those—and some of the most hideous—of ancient paganism.

The lingering paganism in our natures may, as I have said elsewhere, cause us to venerate its relics—its vestiges of dimly historic and pre-historic times—false and cruel as it was rendered by its

priests, who were the butchers of those days, and, besides the ordinary business, were the butchers of men and women and little children. But I certainly think that Christianity, the conqueror of paganism, ought never to have its worship mixed up with the old astronomical rites and ceremonies, the fantastic garments of the obsolete hierarchies, and the play-actings of horrid religious cannibalism. I allude to the continuance of a hideous sacrificial ceremony and rite in the doctrine of "the real body and blood," insisted upon in the words "as born of the Virgin Mary," for the denial of which, as you know, many have been cruelly tortured, and many burned to death at the stake. This is the perpetuation of that cannibalistic rite of those awful days when the human sacrifices were religiously divided and eaten in small pieces by the worshippers of Baal, or the Sun, on Sunday, and the diluted blood of the victim was passed round to be quaffed in sips by communicants: and there were the excommunicated in those days, who were not permitted to sip nor eat the human sacrifice. Whatever new meaning these things may have acquired they are direct vestiges and inheritances from the paganism which Christianity has conquered, and Christianity needs not these things—"real body and blood."

I wrote many years ago in the fourth chapter of "Arbor Low"—"It is not surprising that Averroes or Aven Rosch, the Arabian philosopher and physician, after examining Christianity, as he found it practised in 1150, exclaimed 'Since Christians eat what they worship, let my soul rather have her portion among the philosophers!'"

There is another matter I would briefly allude to here. The Master said: "When ye pray use not vain repetitions, as the heathen do: for they think they shall be heard for their much speaking. Be ye not therefore like unto them." . . . "After this manner therefore pray ye." Then comes the immortal model prayer, a morning prayer, as shewn in the words "Give us this day our daily bread." Now behold how shamefully we disobey the divine injunction not to use vain repetitions as the heathen do, when we make this immortal model prayer itself a heathenish and a vain repetition, by uttering it again and again, and again and again, and sometimes even again and again yet, at short intervals during the one Morning Service, and again and again during the Evening Service—this beautiful Morning Prayer. No wonder if it become indeed, as Tennyson says, "fruitless

prayer." In fact, if the same sort of repetition of a request were perpetrated by a suppliant before a human benefactor, it would become not only "fruitless prayer," but a positively offensive and reprehensible proceeding. I hope you will not think me irreverent if I illustrate this as I did to a literary friend the other day. He had written to me and sent me newspapers reporting on the mummeries regularly carried on at St. Anne's, Buxton. A Church of England clergyman there had gone so far as to deliver a lecture shewing that the Church of England is not, and never was, Protestant, but Catholic. And he proved it to his own satisfaction, and that of his lady listeners, from the Prayer Book. I replied : If these people claim the Prayer Book as theirs I would let them have it and welcome. Suppose you were sitting under your apple-tree in the morning, and a school-boy in passing approached, and begged that you would give him an apple when he came past again in returning from school at noon. And you replied : "Certainly my lad ; you shall have one." Then he turns back in a few minutes and *repeats exactly the same request*, in exactly the same words. You reply again : "Certainly ; you asked that just now and had my answer." Nevertheless the lad returns again in another few minutes, and bothers you with exactly the same request, in exactly the same words. And he keeps it up until he has bothered you with the same request six times before noon, although you have not refused him once, and are anything but deaf—to your regret on this occasion. Would you not be disposed to drive that lad out of your orchard, and keep him out, at the sixth time of asking, and leave his prayer indeed a "*fruitless prayer*"?

But suppose, instead, that you proved as Patient as God, and bore with the tiresome ways of that tiresome boy, and still gave him his apple at noon. Would it not seem an extraordinary aggravation of even his bad manners, if he should come to you again at night, after having had his apple at noon, and ask for it again as if he had not had it, and as if noon had not passed, repeating exactly the same words of rudeness—rude in their persistent repetition—as in the morning ? "Give us this day our daily bread" is not a suitable prayer for the close of the day after the daily bread has been given and partaken of. And in any case it seems to me a mockery to respond to the Divine command "When ye pray use not vain repetitions, as the heathen do," by making such vain repetitions of the

very prayer given as a model of avoidance of repetitions.

Let the ritualists of Buxton have that Prayer-Book if they claim it, as non-Protestant, and let us have a better.

LETTER XLIV.

THE SMITTEN CHEEK AND TAKING NO THOUGHT FOR TO-MORROW.—

INTERNATIONAL LIONS AND LAMBS, EAGLES AND DOVES.—THE ESSENTIAL SPIRIT OF CHRISTIANITY.—THE KINSHIP OF DOGS AND MEN.—PADDY.—BUDDHA CONSULTED.—THE CAREER AND INFLUENCE OF BUDDHA DIVINE AND MIRACULOUS.—THE MIRACULOUS WHEN POSSIBLE NOT SUPERNATURAL.—THE SUPERNATURAL IMPOSSIBLE WITHIN NATURE.—THE WATER CHANGED TO WINE.—THE SONS OF GOD IN GENESIS.

28 AUGUST, 1892.



EADING on from our last quotation we have the following:

"At the same time we must bear in mind that even Christianity in its purest form does not escape from the universal law of polarity, and presents, not the whole truth, but only one very important side of truth. It is the religion of love, purity, gentleness, and charity; important virtues, but not all that constitute the perfection of men and nations. In fact, if carried to the 'falsehood of extremes,' its very virtues become vices. It would not work in practice, if smitten on one cheek to turn the other; and any one who attempted to follow literally the precept of 'taking no thought for the morrow,' and trusting to be fed like the sparrows, would, in modern society, come dangerously near being what we call in Scotland a 'ne'er-do-well,' that is to say, a soft, mouluscous sort of creature, who is a burden on his friends, and ends his days as a pensioner on charity or a writer of begging letters. The foremost men and foremost races of modern society are precisely those who act on the opposite principle, and do look ahead and steer wisely and boldly amidst dangers and difficulties for distant and definite ends.

"In one of the old Norse Sagas there is a saying which has always impressed me greatly. An aged warrior, when asked what he thought

of the new religion, replied : ‘ I have heard a great deal of talk of the old Odin and of the new Christ, but whenever things have come to a real pinch, I have always found that my surest trust was in my own right arm and good sword.’

“ This strong self-reliance and hardy courage to do or to endure is, beyond all doubt, the solid rock foundation upon which the manly character of individuals and of nations must be built up. The softer virtues and graces come afterwards, which are to refine and adorn, and convert the man into the *gentle* man, or one of Nature’s true gentlemen. But without the harder gifts of courage and self-help, a man is not a man, and the raw material is not there out of which to fashion a Gordon or Christian hero.”

These are beautiful passages, and Mr. Laing’s page is adorned, and himself honoured by this his tribute to the name of your dear illustrious Brother, the model Christian soldier, gentleman, and hero. But I don’t agree with him that the qualities of a gentleman come *after* the sterner manly qualities. They come before them in the gentle boy and youth, and ever with them in the after manhood of the manly gentleman.

Now in regard to the smitten cheek and the turning of the other, and the “ taking no thought for the morrow,” we must remember that these precepts were delivered to the disciples who were to be the itinerant Apostles of the Gospel of Peace. “ He went up into a mountain : and when he was set, his disciples came unto him : and he opened his mouth and taught them, saying,” etc. It seems to me very proper conduct for the itinerant and mendicant disciples. It would be quite another thing for the ordinary citizen with his family of little ones dependent upon him, to take no thought for the morrow, and was never intended in the Sermon on the Mount. Nor was it ever intended that the same paterfamilias, having industriously provided for his little ones, should allow their food to be taken by the idle and dishonest ne’er-do-well, and not only so, but, when smitten on the cheek by the idle robber’s violence, should meekly offer him the other to be likewise smitten. These precepts properly apply only to the itinerant mendicant preachers, who present no temptation to an idle robber, and professionally subsist on alms from day to day. You will remember that it was just the same with Buddha and his disciples. It is a mere truism to say that a non-combative and men-

dicant clergy is quite consistent with police, and armies and navies to resist and punish public and private wrong.

I remember many years ago being at a party of friends, who were Friends in another sense, being all Quakers but myself; and they were speaking of the unscriptural folly of arms and armies maintained for the destruction of fellow men; and declared that the proper character of John Bull ought to be that of the lamb rather than the lion. I put in the remark that the moment John Bull became a lamb, or the moment before, it would be desirable that all the eagles of the Continent and America should become doves—and France was an imperial eagle at that time—or the poor lamb would stand a poor chance. And the metamorphosis of the eagles to doves should precede that of the lion to a lamb, because the lion would not meddle with the doves, while the lamb might become an instant prey to the group of eagles. Nobody answered that; but they each looked at me studiously. But they are all Quakers still, that are living, and are most excellent people.

On page 289 Mr. Laing continues :

“ Modern civilisation has been formed, to a great extent, by grafting the gentler virtues of the Gospel on the robust primitive stock of the barbarians who overthrew Rome. It is the example and teaching of Jesus, the son of the carpenter of Nazareth, which have been mainly instrumental in diffusing ideas of divine love, charity, and purity throughout the world, and humanising the iron-clad and iron-souled warriors, whose trust was in their stout hearts and strong right arms, and who knew no law but

The good old plan,
That he should take who has the power,
And he should keep who can.

“ In another respect it is most important that the world should, as far and as long as possible, hold on to Christianity and struggle to save its essential spirit from the shipwreck of its theology, and the sheer impossibility of believing in the literal and historical truth of many of its dogmas.

“ The highest and most consoling beliefs of the human mind are to a great extent bound up with the Christian religion. If we ask ourselves frankly how much, apart from this religion, would remain of

faith in a God and in a future state of existence, the answer must be, very little. Science traces everything back to primeval atoms and germs, and there it leaves us. How came these atoms and energies there, from which this wonderful universe of worlds has been evolved by inevitable laws? What are they in their essence, and what do they mean? The only answer is, it is unknowable. It is 'behind the veil,' and may be anything. Spirit may be matter, matter may be spirit. We have no faculties by which we can even form a conception, from any discoveries of the telescope or microscope, from any experiments in the laboratory, or from any facts susceptible of real human knowledge, of what may be the first cause underlying all these phenomena."

It is curious to read that the world should struggle to save from shipwreck the essential spirit of Christianity, when it is the essential spirit of Christianity which has saved and is saving the world by a divine miracle—the essential spirit of Christianity which Isaiah preached so powerfully; with which Buddha divinely flooded Asia; and which Christ Himself crowned with all-conquering power by His advent, teaching, and Self-sacrifice.

It is no special discovery, no creed, nothing worthy the special name "Agnosticism," to know that we don't know, by comprehension, the boundlessness of the infinity of operating natural Law in the universe; which operating natural Law, operating in its own Omnipotence, we call God. Whom, however, we very well know, limitedly, in what we know of the operating natural Law around us and within us. Nor is it worthy of a special creed-name to know that we don't know the initial mode of the creation of all things, and the secret of the origin, existence, and preservation of life; nor understand the infinite Wisdom of the operating natural Law throughout the universe, which operating Wisdom we call God. Whom we know, limitedly, because we see the Wisdom operating around us, feel it operating within us, and exist by it!

In your last favour, received while I am writing this, you ask if I think that the spirit of man, the son of God, is evolved from the spirit or spirits of inferior animals. I never like to venture a dogmatic opinion, but only to search out and exhibit facts, and reasonings upon facts; and on this question we have no knowledge of facts to reason upon. But I feel sure that the progress of which we have

been speaking as Nature's Law, is a fact ; and that there is no waste in Nature. All that we find out in Nature by investigation proves to be too wonderfully wise, and forecasted, and masterly, and beautiful, to leave room for the impression that it is all a great piece of foolish purposeless waste. I cannot possibly believe that ; and therefore I am sure that all the changes which we see and experience are Nature's progress, mere stages and goals of progress. The divine Buddha, who appears to have been miraculously Enlightened, taught that all life was akin from a plant to a worm ; and from a worm to a king of men ; and that the same spirit progressed from the lowest to the highest with merit, and might retrograde with demerit, back from a king to a worm, and yet return again, with repeated merit.

And now my dear beautiful dog, Paddy, helps me with thoughts on the subject. I have been down from my room into the garden since writing the above, to rest for a few minutes among the flowers and the bees and the butterflies and all the rest—on a garden-bench beneath a willow—and to think. My dear Paddy heard me come down stairs, and pass out, and, hoping it meant a walk, came bounding from another part of the house towards me like a living loving piece of very elastic india-rubber, in a beautiful coat of silky wavy locks. I have heard Paddy called a Silver Derry. I don't know if that is a correct name for him, but I know him to be Golden Good. He is an Irish terrier of the large breed with long locks, as I have hinted, of beautiful buff silk all over him. He barked joy, and jumped on to the garden-bench beside me, and spoke with his voice otherwise than barking, and rubbed against me, and snatched a kiss on my cheek with the tip of his tongue ; and with his beautiful brown eyes he looked joyously into my eyes and we communicated love from soul to soul. Then he sat beside me, touching me with his shoulder all the time in loving friendship, like a Sphinx—sejant not couchant—upright and bold in fellowship. When I look round and say "dear Paddy," his tail actively brushes a certain small radius of the garden-bench, and his pretty drooping ears of silk are raised to hear more of that ; and he snatches another kiss ; and again he looks through my eyes into my soul, which loves him ; with his own dog's eyes—beautiful—from his own dog's soul, which loves me. I know he loves me ; and he knows very well that I love him. He has imagination, that is certain ; and thinks of me when I am absent, and

looks for me in my room. And he dreams, that is certain ; and he has a good memory. And he has a conscience : and shews it in his exhibition of repentance, with drooping tail, and lowered ears, and humble gait, and bowed head, and pleading eyes, when he returns from having yielded to temptation and forsaken the path of duty, when we are out for a walk ; which path of duty is only as wide as, and no wider than, the road we are traversing, or the field we are passing through. But Paddy, yielding to temptation, sometimes sneaks through a hedge, tempted by a brook on the other side, and plunges in in quest of a rat. Or darts off in pursuit on espying some distant rabbit. But presently he returns, and without a word of reproach addressed to him, exhibits the repentance which I have described ; and is *so* thankful when he obtains evidence of forgiveness. I believe it is this repeated forgiveness which largely nourishes his love. It is not the pursuit of the rat or the rabbit, so far as the rat or the rabbit are concerned, that sets his "karma" all wrong, and results in repentance ; but it is for so forgetfully leaving my company when we are out for a ramble together. When I take him to a brook-side he rats without any disturbance of his "karma," or conscience, and expects my applause at his activity in darting about in the waters ; and when he catches a rat he is both happy and proud, and feels that he has done his duty and helped his "karma"—as I also believe, although it is a great mystery.

From all this love, and all these other sympathies and resemblances, I feel sure that Paddy is akin to me in spirit somehow, and therefore I am akin to Paddy in some way ; and all Nature seems to be akin in various degrees.

It is certain that the humanly matured condition of the human soul in the fully developed fully educated man, is not its only condition. We know nothing at present of its still superior condition. But we know positively that it has conditions inferior to that, descending by degrees right down to the inferiority of the dog, and even of the puppy. The inferiority of development of the human soul, corresponds with the inferiority of development of the humam body, or brain, and the one progresses with the other. If the human soul be capable of existing with no higher development than that of the dog, when in like manner physically compressed, yet retains its expansibility for an expanded temple ; why should not the soul of the dog be

equally *capable* of the higher development, or expansion, if placed in an expanded physical temple, and prove to be, after all, what we call the human soul, progressing? The limited soul-expansion in the limited temple to which I have referred is fully illustrated in the human infancy and childhood.

I spoke of Paddy as he sat up beside me on the garden-bench as like a Sphinx *sejant*; because I do not understand him and his place in the creation. I want Buddha to enlighten me as to Paddy's place in the scale of life. The whole race of donkeys seems to be undergoing some term of punishment for the cruelties and other wrongs of a previous existence, and they seem to be born that they might undergo it. And the life of the poor horse is as a rule dreadful slavery, ending with a pitiless death when he can no longer work. Life with such seems to be a mere term of toil for punishment. But Paddy does not seem to be undergoing any term of toil, or trial, or punishment, that I can see. It is true he sometimes gets rolled over by a wicked dog—for none but a wicked dog would do it—larger and stronger than himself; but he does not count that any dishonour, and only shuns that wicked dog's company in future. So far as I can see he is a happy dog; a loved and loving dog. His life seems to be all pleasure except when he is in a state of repentance and that is very brief for he is soon forgiven. It is all play and no work; and every comfort provided night and day. If he wants something he sits up in a begging attitude, and gets something.

Now when Paddy has done his happy and easy march-past in this life, what can there be for him immediately “behind the veil”? Of course I don't know. Let us ask Buddha. Of course I know nothing about it; but I *feel* that if Paddy is a beast created only that he may perish, then so am I. For he seems to have made his progress in Nature very near to me in spirit, so as to have become my dear friend and companion; and he has such a tender conscience that I cannot think there can be such a very very heavy “*karma*” standing against him. Buddha was certain that Paddy was not created only that he might perish; but that he might work his way up to manhood, and to Nirvana—the Redemption. And Buddha's mission seems to have been divine and miraculous. I think I ought to explain what I mean by a miracle and miraculous. I mean by a miracle something so wonderful to our minds that it

would have been regarded as impossible had it not been accomplished. I have spoken of Nature as "comprising all things cosmic seen and felt, and the Power producing all things." Now no one knows the extent of the Power producing all things, nor any limit to it; and therefore no one knows that there can be anything in the cosmos supernatural, for supernatural means *above* the Power that produces all things—above the Power of God! Who then can say that anything is supernatural? If a thing *thought* to be impossible should happen, it would not be the supernatural happening; its occurrence alone proving it to be not above the Power that is in Nature; but quite within the Power that is in Nature; and therefore naturally accomplished.

That Buddha should have left his earthly Paradise, crown, and kingdom, to become a beggar—not to give away this world's goods and so gain grateful or interested followers; but to receive poor alms from others day by day, sufficient for the day only, and possess nothing more, "like the sparrows;" that Buddha should have done this, and then set himself—a beggar—in opposition to the greatest power on earth, the most potent and most wealthy hierarchies, which ruled and over-ruled mankind in conscience, opinion, and judgment; the beggar thus setting himself in opposition to the power and prejudices of mankind; and yet that Buddha should have succeeded in winning Asia; becoming a sort of co-God of many nations; and flooding Asia with his wondrous Light; a result apparently so impossible, is what I call indisputably Divine and miraculous, but not supernatural; because it is an accomplished fact. I say all this to shew that I think Buddha's mission was assuredly divine, and that he was divinely Enlightened; and therefore his statements deserve at least great respect, while any opinion of mine on such a subject would be valueless.

And speaking thus of miracles reminds me to say that, although I would leave it to everyone to think of the Biblical miracles as he will, or may, or can, there is not much force in Mr. Laing's argument against the changing of water to wine by Jesus at the wedding feast. He says :

"When nothing was known of the constitution of water or of wine, except that they were both fluids, it was comparatively easy to accept the statement that such a conversion really took place. But now we

know that water consists of oxygen and hydrogen combined in a certain simple proportion, and of these and nothing else ; while wine contains in addition nitrogen, carbon, and other elements combined in very complicated proportions. If the water was not really changed into wine, but only seemed to be so, it was a mere juggling trick, such as the Wizard of the North can show us any day for a shilling. But if it was really changed, something must have been created out of nothing to supply the elements which were not in the original water and were not put into it from without."

I cannot see what is to prevent "the Power that produces all things" from putting into the water, in the twinkling of an eye, the necessary addition of "nitrogen, carbon, and other elements"—elements of which He is the Master, as He is the Master of the combination of them in what we call Chemistry, which is but man's acquired insight into His laws of combination of those elements. The chemist in his laboratory calls for this and that for his combinations, and his attendant immediately brings this and that to his hand. I cannot see why an anthropomorphous Divinity, with more complete knowledge and power and authority than the chemist, with the "nitrogen and carbon" at hand in the air of the banqueting room, should not call for an instant supply of the "other elements," and as instantly receive them from *His* attendants. It is like speaking of the Father of the anthropomorphous Divinity—His Son through whom He wrought—as a slave, instead of the Omnipotent Law-maker, to suppose there would be any difficulty about this.

How much more reasonable it would be, if one were in a suitable frame of mind, instead of setting up our little bit of knowledge of Chemistry—God's own mode of working—as a testimony against Christ's power, to say : "Chemistry only shews us how reasonable such a miracle as this was, and how easy it must have been to a Divinity to change water to wine. When we were ignorant of chemistry it seemed to us impossible; but now we know that He had only to exercise His divine knowledge and power, and add to the water such and such proportions of "nitrogen and carbon" which were at hand in the air of the room, and very slightly some other elements which He could command an angel to bring Him instantly, and the water would be become wine of a divine vintage." But I shall still skip the miracles.

You ask, Who were the sons of God referred to in Genesis? Were they not the sons of Adam and Eve?

It was the belief of our early forefathers, handed down by general tradition, that the Gods and the sons of the Gods, walked upon the earth in the image of man, and associated with the early families of mankind. It is not only mentioned in Genesis, but the same tale was handed down by the ancient Egyptians through the Greeks, and independently by the Greeks themselves, and by all other ancient families of mankind. It appears to have been quite a general prehistoric belief. What foundation it had, no one can tell. Most of the heroes of ancient days had a divine pedigree, their fathers being celestial and their mothers the daughters of men. I have said before that the beginning of Genesis must be regarded as written with hidden meanings, and not to be read literally. Josephus has stated that this was so, and he promised to explain its esoteric meanings, but if he ever wrote that explanation, it has never reached us.

And now, since writing the foregoing, I have something more to say to you about Paddy. I think I have again and again in these letters referred to what I have described as a sort of clairvoyant faculty apparent in dogs. And now I find that dogs really possess this faculty. It is Paddy, for one, who has proven it. So far as my observation has extended the object seen clairvoyantly has been previously familiar to the mind of the dog, and then when reminded of it by words he has seen its action afar off and through opaque dense solidity; whether it be man, woman, child, or dog. I have no means of knowing whether the clairvoyant dog can also see distant objects that have not been previously depicted in his mind from actual presence. Paddy's evidence was given and taken thus: The familiar name of one of Paddy's familiar household friends was mentioned to him by Adeline, who held him; when he directly looked towards the room where his friend was shut in completely, with no chink through which to get sight of her. Without moving about or making the slightest sound she, in the other room, stooped down, and his bright brown eyes followed the action through the wall. Then she arose and his gaze rose exactly responsive. She then stretched herself up and reached her hand towards the ceiling, the movement being followed exactly by the beautiful eyes, and the uplifted hand was gazed at inquisitively—through the solid wall. The

exactly uniform results of this experiment prove that Paddy by means of his physical eyes saw the silent movements in the next room. And I have seen him watch, and follow with his eyes, unheard movements with several rooms and walls between. I have also known another dog who could recognize an unheard adversary, or object of his aversion, through the whole sight-impediment of a large house, from the back to the street in front; and this not on rare occasions but almost daily. And this will probably bring to your mind, as it has brought to mine, the private "Dog Bob" Surbiton Christmas Card of 1889—the story by your gifted daughter-in-law, and the picture of Bob on the road by her gifted sister. In case you have not a complete recollection of the story, and have not your copy in reach, I will repeat it here, with the card before me :

"The remarkable intelligence possessed by many species of dogs, and their capacity for performing extraordinary feats, has been illustrated by a well-authenticated case which has been brought to our notice during the present week. Mrs. J. D. Taylor, of Thames-villa, Portsmouth-road, Surbiton, owns a good specimen of the Dandy Dinmont, $7\frac{1}{2}$ years old, which has given frequent proofs of its intelligence. During the first part of the present month, Mrs. Taylor was staying with her aunt at 88, Marine-parade, Brighton, and she had with her the dog in question, which rejoices in the sobriquet of 'Bob.' One Friday evening, during dinner, Mrs. Taylor offered some food to Bob, which he declined to accept. She thereupon remarked to the animal that no doubt certain other dogs (which she mentioned by name, and which were at that time at Surbiton) would be glad to have it. Upon hearing the names of his old companions mentioned, Bob immediately pricked up his ears, and flew to the front door. Mrs. Taylor opened the door, and Bob, after giving a loud bark, as much as to say 'good-bye,' rushed out into the street. As he did not return, Mrs. Taylor became very anxious for his welfare, and advertised for her lost dog all over Brighton, offering a substantial reward for his recovery. She heard nothing more of him until Monday morning, when a telegram was received from Surbiton stating that Bob had arrived home without collar or muzzle, on the previous day. He had tramped the whole of the distance from Brighton—over 50 miles—along a road that he had never traversed before, and beyond being very tired and hungry, he was none the worse for his singular

adventure. To many people this story will, perhaps, sound like mere romance. To such we can only say that we received the particulars from Mrs. Taylor herself, and that we have seen a copy of the reward-bills circulated in Brighton, and the telegram that was received from Surbiton, announcing the arrival of the dog ; and we have every reason to believe that the facts as narrated are absolutely correct ”

When I first read this—and I must have written so to you at the time—I could only account for Bob’s conduct by attributing it to the operation of some sort of clairvoyant faculty. One can conceive no other compass to guide him in such a correct course on such an utterly strange road. He could have no clew whatever by means of his journey from Surbiton to Brighton by railway, dozing under the seat, unconscious of motion ; and no scent could have extended that distance of fifty-two miles. When the names of his familiar companions at home were mentioned to Bob by his mistress, he must have actually seen them, unhindered by the intervening space and obstacles of fifty-two miles, and made direct towards them ; which is no easier to understand than the rejected theory of Scent, or any other theory. But Paddy has quite established my belief in this canine clairvoyancy.

LETTER XLV.

THE GOD OF ABRAHAM.—THE GOD OF JOB, OF THE PSALMS, AND OF THE PROPHETS.—THE GOD OF THE GRECIANS—THE OLYMPIAN JOVE AND HIS WIFE.—THE CRIMES AND PUNISHMENT OF DAVID.—MR. LAING’S NOBLE EXPOSITION OF CHRISTIANITY.—THE GREAT “UNKNOWN” IN WHICH EVERYTHING IS POSSIBLE.—DAVID’S PENITENCE.—MR. LAING’S PATRIOTIC, CHIVALROUS, AND CHRISTIAN “PRACTICAL LIFE.”—“FEAR NOTHING ; MAKE THE BEST OF EVERYTHING.”

4 SEPTEMBER, 1892.



N page 293 Mr. Laing reviews what he considers the progress of the human conception of God as exhibited in the Bible, and the unfixity of the idea ; from what he describes as the mere tribal God of Abraham,

Isaac, and Jacob, to the national God of Israel—which, by the by, is only another name for the same Jacob, and involves no change of idea—onward to the God of the universe, “degrading the other gods to the category of dumb idols.” But in all this I think we see but the expression of the one idea of the same God, and no unfixity; the supreme superiority having been claimed from Abraham downwards, and to Adam upwards; where He is distinctly represented as the Creator of the Universe. Our author dwells much on the “anthropomorphic conceptions” of God. I do not myself see anything outrageous in such conceptions. I do not see any objection to the thought of the Infinite and therefore Omnipresent God, who guides the Natural Progress of which we have been speaking, revealing Himself, in the furtherance of His local Providence, even in the form of man, or in any other form. To assume that the fixed and ultimate form of God is that of man, is to lose sight of His attribute of Infinity, which must be amorphous, or at least without the form of man, as it is beyond the conception of man.

I know of no Theos so sublimely and divinely portrayed as God in the Bible. The Hindoo theology is grand, but there is no God in it to compare, on the whole, with the God of Job; of the Psalms; and of the Prophets. Look at the God and Father of Gods of ancient Greek civilization—Jove the Thunderer—the Father of the Gods and men, although himself the Son of Saturn. He, according to Homer and the others was by no means perfectly straightforward in his dealings with Gods and Goddesses, and men and women. And he used to have scandalous squabbles with his wife, of whom he seemed sometimes half afraid. In the first Iliad we have a little scene of this sort. Thetis the goddess-mother of Achilles presents herself before God in Heaven with a petition on behalf of her son; to whom he replies :

“Truly now this will be a grievous matter, since thou wilt cause me to give offence to Juno, when she shall irritate me with reproachful words. For, even without reason, she is perpetually chiding me amongst the immortal gods, and says that I aid the Trojans in battle.” Etc. After the departure of Thetis, Juno, having observed something passing between her and the Thunderer, chides him thus :

“Which of the gods again, O deceitful one, has been concerting measures with thee? Ever is it agreeable to thee, being apart from

me, plotting secret things, to decide thereon ; nor hast thou ever yet deigned willingly to tell me one word of what thou dost meditate."

After further conversation the Thunderer becomes irritated against the Queen of Heaven, and he exclaims :

"Perverse one ! thou art always suspecting, nor do I escape thee. Nevertheless thou shalt produce no effect at all, but thou shalt be farther from my heart : and this will be more bitter to thee. But granted this be so, it appears to be my pleasure. But sit down in peace, and obey my mandate, lest as many deities as are in Olympus avail thee not against me, I drawing near, when I shall lay my resistless hands upon thee."

The immortal gods hear the dispute, and Vulcan tries to make peace, saying :

"Be patient, my mother, and restrain thyself, although grieved, lest with my own eyes I see thee beaten, being very dear to me ; nor then indeed should I be able, though full of grief, to assist thee ; for Olympian Jove is difficult to be opposed."

There is another little quarrel of this sort depicted in the Fourth Iliad ; and another in the Eighth, where the Thunderer says to his wife "There is nothing more impudent than thou." And again in the Fifteenth Iliad we have the following from the "Father of men and Gods" :

"O Juno, of evil arts, impracticable, thy stratagem has made noble Hector cease from battle, and put his troops to flight. Indeed I know not whether again thou mayest not be the first to reap the fruits of thy pernicious machinations, and I may chastise thee with stripes. Dost thou not remember when thou didst swing from on high, and I hung two anvils from thy feet, and bound a golden chain around thy hands, that could not be broken ? And thou didst hang in the air and clouds, and the gods commiserated thee throughout lofty Olympus ; but standing around, they were not able to release thee ; but whomsoever I caught, seizing, I hurled from the threshold of heaven, till he reached the earth, hardly breathing." Etc. Thus, if we may believe Homer—and I should like to know why not—there used to be regular rows in Heaven between Jupiter and his Wife—Jupiter the Father of the Gods, and Juno the Queen of Heaven ; the Heaven and the supreme God and Goddess of the highly civilized Greeks.

Had our author had this God the Father of the Gods of the highly civilized Greeks and of men, to criticise instead of the God of the Hebrews and His Son Jesus, anthropomorphically the Son of man, how much more reasonable would have been his contempt for such a theogony !

Then on the same page our author expresses his just indignation at the “foul villiany” of David, who was described as a man after God’s own heart. It struck me when I was a child, devouring many books, including the Bible, how wonderfully the latter differed from all other historical and biographical books which I had read, in its perfectly unbiased narration of both the good and bad actions of its heroes and heroines. I found that in books generally you must seek for the record of a hero’s faults in the writings of his opponents ; and find there also the suppression or diminution of his virtues : and for a full display of his virtues you must read another book, written by his partial friend or admirer, who would fully shew them forth, and conceal as much as possible, or palliate, his vices. This seems to be human nature, the natural result of human prejudices. But it is not the human nature of the various compilers of the Bible. The good and evil qualities and deeds of the patriarchs, prophets, princes, kings, queens, and all characters chronicled, are recorded with an amazing, and seemingly unnatural impartiality and exactness. I can see nothing in the history of David to shew that his awful crime was lightly passed over, or “condoned” as Mr. Laing asserts. But I do see that his punishment was very great, and his repentance also. One portion of his punishment, and no light portion, was the revolt and death of his dearly beloved son Absalom. Surely the heinousness of David’s crime was fully appreciated, and clearly enough denounced. Behold Nathan the prophet standing boldly before him, and, after having led the king into a trap by the relation of a parable, exclaiming : “Thou art the man ! . . . Wherefore hast thou despised the commandment of the Lord to do evil in his sight ? Thou hast killed Uriah the Hittite with the sword, and hast taken his wife to be thy wife, and hast slain him with the sword of the children of Ammon. Now therefore the sword shall never depart from thine house ; because thou hast despised me, and hast taken the wife of Uriah the Hittite to be thy wife. Thus saith the Lord, Behold I will raise up evil against thee out of thine own house,” etc.

We must acknowledge that this great crime was only condoned after great repentance, great punishment, and great sorrow. Imagine the bitterness of the cry, when he covered his face, and cried with a loud voice :

“O my son Absalom ! O Absalom, my son, my son !” Absalom so dearly beloved, yet so wicked of heart as to be a fit and ready instrument of the Divine punishment of his father. And then, at last, must we find fault with God because David on his death-bed, after passing through great afflictions, was able to say :

“As the Lord liveth, that hath redeemed my soul out of all distress.”? I trust not. It is a beautiful part of the Great Redemption !

But I really think that Mr. Laing, although he seems to try to hold out boldly, is yet getting very near to a positive acknowledgment of God.

But before quoting further let me express one more thought on the punishment of David. Is it not awful to think that his secret crimes, which he thought to keep secret for ever, with only Joab in his confidence, are so published to all the world, and to all generations, that the infamy of his deeds is as conspicuous to all people, and as permanently conspicuous, as the light of Sirius in the heavens, and so will remain until the end of earth’s time ?

And this is the passage which I was about to quote, shewing what a practical Christian the author is, after all. It is a continuation of, and from, the page last quoted :

“After all we must fall back on Christianity for any grounds upon which to trust, more or less faintly, in the ‘larger hope.’ The Christian religion, apart from any question of miracles, is an existing fact. It is a fact which for nineteen centuries has proved, on the whole, in accordance with other facts and with the deepest feelings and highest aspirations of the noblest men and women of the foremost races in the progressive march of civilisation. Why do we say that its moral teachings, such as we find in the Sermon on the Mount, and in St. Paul’s definition of Christian charity, carry conviction with them and prove themselves ? Because they accord with, and give the best expression to, feelings, which in the course of evolution of the human mind from barbarism to civilisation have become instinctive. We may be able to trace their origin and development, we

may be able to see that they are not primary instincts, implanted at birth like those of the lower animals, but secondary instincts, formed by the action of a civilised environment on hereditary aptitudes. Still there they are, and being what they are, and living in the age and society in which we actually live, they are inevitable and necessary instincts, and it requires no train of reasoning or laboured reflection to make us feel that 'right is right,' and that it is better for ourselves and others to act on such precepts as those of 'loving our neighbours as ourselves,' and 'doing as we would be done by', rather than to reverse these rules and obey the selfish promptings of animal nature. Of the same order, though less clear and cogent, are the teachings of the Gospel respecting God and immortality. They are less clear and less cogent, because the only evidence by which they could be demonstrated from without, that of miracles, has broken down and failed us ; and because we cannot verify them experimentally by an appeal to facts, as we can in regard to the working of moral laws and precepts. But it still remains that they are ideas which have arisen inevitably in the course of the evolution of the human mind ; and that they fit in with and satisfy, in a way which no other ideas can do, many of the best and deepest feelings which have equally been developed in that mind, in the course of its progressive ascent from lower to higher things. It remains also that true science, while it can add nothing to this proof, takes nothing from it, and while it excludes miracles and supernatural interference after the order of the universe has been once established, leads us back step by step to a great Unknown, in which, from the very fact that it is unknown, everything is possible."

All this shews the author to be a good practical Christian.

As I have said before we must admit that God is unknown to us in His infinity of greatness. But He is well known to us so far as in Him we live, and move, and have our being ; as the Lord of Life, and all life's benefactions. It is a curious confession of our author that we are led "step by step to a great Unknown"—which must mean unknown in the extent of His greatness—"in which from the very fact that it is unknown, everything is possible."

That is just what I have been arguing all along ; and therefore, "everything being possible," none of the miracles can be impossible. And what with its false science, for which the author is not

responsible, and the consequent false deductions therefrom, the whole book thus far, in my opinion, entirely fails in its purpose. Its purpose appears to be to destroy faith in God, and in the divinity of the Bible and of Christianity. But in my opinion the author's arguments in that direction are perfectly invalid, and failures ; and he almost concludes with a confession of faith in God, and in the divinity of Christ. Certainly his eloquent and beautiful excuses in favour of Christianity, will do Christianity no harm, if harm to it were possible.

And now, even one more thought yet, about repentant David. While his great crimes are exposed to all ages with the conspicuousness of the brightest star in the heavens, the expressions of his penitence and sorrow are no less conspicuous in his penitential Psalms ; which have become forms of expressions of penitence to all Christendom, and will remain the classic language or expression of penitence for all time to come, for all nations.

The next chapter of "Modern Science and Modern Thought," entitled "Practical Life," is very beautiful as you have already found out before I have reached it. It is a noble exposition of the potential outcome and better form resulting from the march and drill of this earthly career, in the later practical life of this earthly career. But you and I have decided to believe that the results of all this process of progress or man-making, cannot be limited merely to the later practical life of this earthly career ; that so much cannot be made and done, all in vain, in suffering annihilation in the terrestrial death. It seems to us, noble as Mr. Laing depicts it, too small a result for so much toil and trial and sorrow ; and so we claim results still further progressive "behind the veil" where "everything is possible." But the chapter is really splendid and manly, as you have found. For instance these words on page 301 :

"From these common and universal forms of 'self-reverence' we rise, step by step, to the higher ideals, which, in every rank and every condition of life, give us among gifted natures what may be called the 'salt of the earth,' and the shining examples which guide the world to higher things—noble men and noble women. A Sidney, dying on the field of Zutphen, hands over the cup of water to a wounded soldier because his soul, nourished on noble thoughts, and his fancy, fed by the old ballads which, like that of 'Chevy Chase,' stirred him

like a trumpet-blast, had led him to conceive an ideal of a perfect knight which would have been tarnished by any shade of a selfish action. Gordon sacrifices his life at Khartoum, not only cheerfully but almost instinctively, because the suggestion that he might save himself by abandoning those who had trusted in him seems an absolute impossibility."

I love Mr. Laing for these noble words. He has himself a noble heart, and a splendid immortal soul, whether he believe it or not. Here again he speaks beautiful refreshing hopeful truths :

" It is a great advantage of the present day that education and the press bring such instances of devoted heroism vividly before millions who would never otherwise have heard of them. The influence of the press, both in the way of books and newspapers, is happily in this country almost entirely one which makes for good. There is not a noble act done throughout the world, by high or low, by private or officer, by soldier or civilian, which is not held up for praise and admiration ; while any signal instance of cowardice or selfishness is held up to contempt. Newspaper correspondence and leading articles have, to a great extent, superseded sermons, and do the practical moral work of the world in asserting the right and rebuking wickedness in high places. In like manner all the higher works of poetry, fiction, and biography have a good tendency, and are read by an ever-increasing number of readers. Enid and Elaine, Jeanie Deans, Laura Pendennis, Lucy Roberts, are the sort of models set before girls ; while boys who have any heroic fibre in their nature are fed with such lives as those of Lawrence and Gordon." Thus, once more, he adorns his page with references to your illustrious dear Brother, and with these his references I, too, adorn my letter.

Here is another evidence of his Christian charity :

" I have always found through life, a safe rule to go by was, if you hear an ill-natured story of a man, discount nine-tenths of it as a lie, and if of a woman, don't believe a word of it."

In this chapter throughout Mr. Laing shews himself to be a wise and noble patriot. It is a literary gem, as you well know before I have found it out. It is a golden gem set with sparkling diamonds of wisdom and truth and graceful chivalry and Christian kindness.

And it is quite a surprise to learn, on page 319, that this good man, whose book I have been so long and so freely, and, I trust,

fairly criticising, is a venerable Christian gentleman, who has been practising his own golden rules of life, and his Christian Charity, up to and beyond the Scriptural span. Let me finish this letter with his conclusion of his last chapter—except his “Supplemental Chapter,” which I have not yet looked at :

“There is much more to be said, but my object is not to preach, or moralise, but simply to record a few of the practical rules and reflections which have impressed themselves on me in the course of a long and busy life. I do so in the hope that perchance they may awaken useful thoughts in some, especially of the younger readers, who may happen to glance over these pages. This much I may say for them, I have tried them and found them work well. I have lived for more than the Scriptural span of threescore and ten years, a life of varied fortunes and many experiences. I may say, in the words which my favourite poet, Tennyson, puts into the mouth of Ulysses :

For ever roaming with a hungry heart,
Much have I seen and known, cities of men,
And councils, climates, governments.

And the conclusion I come to is, not that of the Preacher, ‘Vanity of vanities, all is vanity,’ but rather that life, with all its drawbacks, is worth living ; and that to have been born in a civilised country in the nineteenth century is a boon for which a man can never be sufficiently thankful. Some may find it otherwise from no fault of their own ; more by their own fault ; but the majority of men and women may lead useful, honourable, and on the whole fairly happy lives, if they will act on the maxim which I have always endeavoured, however imperfectly, to follow—

FEAR NOTHING ; MAKE THE BEST OF EVERYTHING.”

Did I not hint that the author of “Modern Science and Modern Thought,” seemed to have an acknowledgment of God in his heart, if only very very dimly realized in his understanding, and sometimes denied, and sometimes so doubtfully expressed by his pen ?

He confesses that life, although the rule of Nature is progress, rather than happiness, “is a boon for which a man can never be sufficiently thankful.”

Thankful to whom or to what ?

Surely not thankful to a mere mechanical Clock ! He in his good venerable heart *is* thankful, with a sense that he "can never be sufficiently thankful," for the boon of life, and its preservation, and its attendant joys and comforts, and its progress to higher education even through refining sorrows.

Not thankful to a Clock ! Certainly not. But thankful to the living Power which made the Clock of Nature, and, by which still-living-and-operating Power, the beautiful Clock still ticks and goes so beneficially. How can he "never be sufficiently thankful" to a Clock ? He must be thankful *for* the Clock, *to* the Almighty Clock-Maker and Clock-Keeper !

LETTER XLVI.

DEFINITION OF NATURE.—MR. LAING'S REVIEW OF "DAWN OF CREATION AND OF WORSHIP."—DIGRESSIONS.—THE BIBLE A DIVINE EVOLUTION.—HUMAN ERRORS IN THE BIBLE.—ON THE RIGHT SIDE WITH WRONG WEAPONS : ON THE WRONG SIDE WITH NO WEAPONS.—INVOLUTION AND EVOLUTION.—"GIVE ME LIGHT."—"PROEM TO GENESIS."—MORE PALÆOLITHS.—DIVINE INSPIRATION.—ETERNAL PUNISHMENTS.—A MODEL RECTOR AND BISHOP.

II SEPTEMBER, 1892.



SEE and feel that I ought to say a word more about my definition of Nature ; which I think was "all things cosmic, seen and felt, and the Power producing all things." Some will suggest that there are things in Nature not included in that definition. Well, suppose we say "things seeable and feelable," as well as seen and felt. That is only another way of expressing the same thought, but including things not yet seen and felt.

We see the sun and sunshine, and feel its warmth on the skin, in the blood, and in respiration. We see the bird singing and feel his music in our mind through the ear. We see the flower and feel its perfume through the nose. There are things seen and not otherwise felt. We see the lightning, and feel the wave of its thunder through the ear. All our emotions, natural, and unseen, are felt. There are

imagination, reasoning, memory, dreams—kindred mysteries—all natural, seen and felt in the mind or brain, and not otherwise seen or felt, unless by symbolic expression to others through their ears, eyes, or manual touch. There is Life : that is seen active in others, and felt in ourselves—a mystery. The POWER is certainly felt also ; and is seen also in its operations, as in all life, and motion or force of every sort.

Besides all this there is the Unknown—unknown to us, but certainly known to some other intelligence or intelligences, to whom we may presume it must be all seeable or feelable, or both. But this is beyond our limited sphere of Nature, and belongs to the Infinite.

We now come to the last section of the book under review—the “Supplemental Chapter”—commencing with Mr. Laing’s review of an article in the *Nineteenth Century*, entitled “Dawn of Creation and of Worship,” which I have never seen, as I now always avoid such literature ; unless expressly requested to read and report, as in this instance I am reading and writing in obedience to your honour-conferring wish. Now, however, my province is merely to review the review, and not the original ; for which I am thankful.

Mr. Laing complains that “about one-third of the essay is taken up by a digression, which is almost entirely irrelevant.” What will he have to say to me, who acknowledge no iron road through any subject of which I ever treat ; but digress like unto a fly—worse than a little dog, eversomuch ; because I must have my ups and downs, as well as level zig-zags. I like it ; and cannot do without it. It is all very well for the bee to make a bee-line journey back home, when he has gathered enough honey. I never feel like that. And must always be gathering more and more, from Nature and Nature’s thought, and always keep up the outward-bound digressive ramble from flower to flower. This is merely an excuse in anticipation of the charge of digression, and an instance of it too. And I shall do it again.

And, although such a desperate sinner myself, I mischievously admire to look on and see how eloquently and powerfully Mr. Laing shews up another’s weaknesses.

But as I read on there becomes no “our side” in the quarrel ; for I find both sides wrong. Mr. Laing again hurls at his adversary the unsubstantial geological hundreds of millions of years, which I have already shewn to be the result of utterly false inferences.

On the other hand the author of the article seems to stand out for a literal acceptance of the account of the Creation in Genesis, which literal acceptance is impossible.

I find the Bible to be a very wonderful book. As an evolution of a very early civilization it is truly marvellous ; and I regard it as a Divine evolution, as much as I regard man himself as a Divine evolution. It is a Divine evolution through man ; and through him again and again and again in his innumerable transcriptions of it ; and that alone is sufficient to account for any human errors in it ; which human errors do not annul one iota of its Divinity. I believe the Biblical collection to be Divine evolution without setting up the bound volume as an infallible God in itself, in which any unimportant mutilations or mutations or interpolations have been prevented by a miraculous Divine Guardianship of its every letter, to the miraculous exclusion of every other letter. And I say this with Mr. Laing's powerful words in full view and fully approved, that :

"The time is long past when the *facts* had to be tested by their correspondence with the *theory* of an inspired revelation ; nowadays it is the *theory* which has to be tested by its correspondence with the *facts*."

It is pretty certain that the stars were not created to give light upon the earth, when one small moon gives more light to it than all the countless constellations of space put together. And it is certain that the earth was not created in six days of twenty-four solar hours each ; and that too, according to the literal reading in Genesis, before the solar days themselves were commenced. Nor could the Creator have been regulated in His work by any solar morning and evening because morning and evening are strictly local and ever-varying conditions and occasions, and would indicate some local earthly workshop where all the work of creation of sun and moon and "stars" was going on. There is no morning and evening outside the light and shadow of a revolving planet or satellite. Of this I have spoken before.

Such a theory utterly fails when "tested by its correspondence with *facts*."

The Bible may still be a Divine Book, produced by Divine human agency, without miraculous exclusion of human error from its pages, error occasioned by so much human handling, as I have already hinted.

Suppose some great irresponsible scribe—some High Priest—were copying a hundredth copy of one of the sacred books, and he perceived what seemed to him a hiatus in the text, which seeming hiatus he could fill in fitly, as he thought, with some tradition which was considered by all the Doctors of the then present and the past, as sacredly true : who or what was to prevent him from filling up the seeming gap, or omission, with that holy tradition, either in the way of preface or interpolation ? The miracle of a Jovian thunderbolt might do it ; or the miracle of a sun-dart from Apollo might do it. But neither of these, nor any other miracle did it. And yet the Book to this day remains a Divine Book for all that ; and still a miracle in itself ! It is for this reason that I have skipped the discussion of the miracles.

In many pages this “ Supplemental Chapter ” is a resumé of Mr. Laing’s arguments in his book, which we have already examined, and therefore need not re-argue upon. And in my humble opinion both Mr. Laing and his reviewed author are wrong, as I have already said. But I think there is this difference in favour of Mr. Laing : he is on the right side with wrong weapons, while his reviewed author is on the wrong side with no weapons at all.

After having satirically held up the errors of Genesis to ridicule, and their defender with them as their defender ; Mr. Laing grows serenely philosophic ; and gains our admiration again for what we consider his ultimate justice to the Bible. On page 336, after reference to the ancient fabulous mythologies, he says :

“ At other times, among more simple and severe races, or with more philosophic minds in the inner circle of a hereditary priesthood, the fables of polytheism were rejected, and the idea prevailed, either of a unity of nature implying a single author, or of such a preponderance of the national God over all others as led by a different path to the same result of monotheism. The real merit of the Jewish race and of the Hebrew scriptures is to have conceived this idea earlier, and retained it more firmly, than any of the less philosophical and more immoral religions of the ancient world ; and this is a merit of which they can never be deprived, however much the literal accuracy, and consequently the inspiration and miraculous attributes, of these venerable books may be disproved and disappear.”

This confession, from one calling himself an Agnostic, is about as

much as can be expected ; and is to be placed to the credit of the confessor. But we, of course, will go further ; and, I trust, with visible good reason. Whatever of sublime truth and light there is in the Bible, beyond its mere historical records—which are also wonderful dramas exhibited for our instruction—I take to be the result of evolution ; and even of human evolution if that expression be preferred.

I remember Mr. Farquhar observing in one of his letters to you that there could be no evolution without previous involution.

Now it seems to me that such human evolution of sublime light as the Bible has proved to be, right down from the various dark periods of its bursting forth to the brightest present, must and can only be the result of Divine involution first. How can man discover the truth which is hidden in darkness, and evolve it, without the previous involution of light that he may find it ? And that involution of light I take to be the very same thing as inspiration—inspiration itself.

Whenever I am writing on a dim subject, and groping in its dimness, I whisper the request—"Give me light, that I may discover truth." Now I certainly should never whisper that petition if I had not full faith in the possibility that it might reach the Power who could give the light, and that the light might be given. Yet I myself could not be sure that I had received the divine light in response to the whisper of faith : but you and others declare that it has been received, and communicated in these letters ; and therefore you ask that they may be made into a book. Of one thing in connection with them I am sure. If there really be any good and light in them, it is not my good and light. But if there be evil and error in them, the evil and error are certainly and entirely mine. We have come to the conclusion that, except with the First Cause, there can be no evolution without previous involution. We have also come to the conclusion from the testimony of experience and observation, as well as of the prophets, that evil is involved in us at our very birth, as the mysterious inheritance of the soul, and the cause of the soul's rebirth, that it may be educated, and purged of its evil. Thus all evil evolution is our own ; and I for one will never be so mean as to charge it to the devil. If left without any help at all we believe that our original evil must remain unpurged, and our natural darkness undispersed. But if we ask for light and get it, and it become a visible

fact, it is only the evolution of the involution of God—the Good of the Universe. And what may happen to the humblest of those writers who whisper the petition for light, and for the power of good, DID happen to the giants of primitive thought and literature, who were inspired to write the wonderful books of the Bible, yet were all men liable to human error ; from which human error no miraculous protection guarded them and their work. Yet their work was indeed miraculous after all, in having lasted to this day with its wonderful light undiminished : light evolved in the midst of the darkness of their Dark ages, after men had forgotten God, and at the dawn of a returning civilization, to be the lasting light of the world—the Pharos of the generations. The combined Divine and human are evident in what we realize in these books of the wonderful Divine light and the trivial human error. I don't think I can conceive any greater miracles after all than the human evolution of the Bible and Christianity. I speak while in considerable ignorance of the great bulk of the Buddhist sacred books. Of course this divine involution idea applies to all light evolved through man.

The next paper discussed is the same author's "Proem to Genesis" which I have never seen, and never even heard of until now. It seems to me merely another round of the foregoing fight under similar conditions ; and does not need any remark from me. Mr. Laing thinks he occupies a very strong position in arguing upon the discovery of Palæolithic man, and he says :

" The discovery of Palæolithic man is that which has really given the greatest shock to received theological opinions ; for this discovery, which is an entirely new one of the last half century, though now confirmed by innumerable instances, not only flatly contradicts the narratives of recent descent from Adam and Noah, but it assails, in its most vital point, the whole dogma of Pauline Christianity."

This is what I call using a wrong, or false, weapon ; for whatever may be true or false about Adam or Noah, no Palæolithic man *has* been discovered yet of the remote antiquity of the so-called rude implements of the old river gravels. The works attributed to him are not his works, but the works of Nature's storms and tides. Since I wrote to you on that subject I have been again giving attention to it on the sea beaches with confirmatory evidences at my feet. I have collected some more storm-made specimens of Paleolithic work quite

as interesting as any in the Museums—and my own Museum contains a great number—but they were never formed by Palæolithic man. This subject, however, needs no re-argument here.

The author of "Proem to Genesis" is certainly on the wrong side in claiming *literal* truth for the account of the Creation in Genesis, whatever unlikely *esoteric* meaning there might be in that account; and he has no weapon whatever to oppose to Mr. Laing's unneeded false ones of the immense antiquity of man, and the hundreds of millions of years consumed in the formation of the earth's strata. Mr. Laing, of course, still argues against revelation and inspiration, because of this unsatisfactory preface in Genesis.

I have already spoken of the possible interpolation of errors in an otherwise perfect manuscript, by the act of a possible irresponsible High Priest. But let me put the question of revelation and inspiration in another way, to shew how it might be found side by side with human error, all from the same pen. Never mind if I seem tautological, please; there will be emphasis in the repetition, if nothing more.

Suppose I—I would have said suppose you, but it would have become uncivil a few sentences later, and I had better be egotistic than uncivil. Suppose I, in writing some of these letters, seeking truth, groping for it in darkness, and whispering "Give me light," should receive instead of a very feeble light, a great flood of it, and discover some important truth, and evolve it in my letter. Would not that be the revelation of truth by means of the light of Divine involution or inspiration? I hope so. Then suppose that in another letter of the same series—and here is where the rudeness would have come in—I evolved only my own foolishness, with no light or truth in it, but only my own guessing, which shall in time be proven false: or suppose I write that which another has told or taught me; which, when it prove false, will prove to have been the involution of falsehood, which I have evolved. Why should my letters of light be condemned with my letters of darkness; and their inspiration denied, because they are in uninspired company? And there is nothing to prevent my writing the untrue letters, either as preface or sequence of the others—neither lightning flash, nor fatal arrow from the sun. Such manner of dealing was never God's manner of dealing, during all the gradual Progress of Nature by the gradual evolution of good-

ness and light, to mix with evil and darkness.

Thus I believe in the revelation—Divine revelation, in the Bible by Divine inspiration, without wondering at the fallibility of passages, which, *because* fallible, never were Divinely inspired. As a child I never believed in the literal account of the creation ; what child ever could ? but I always believed in the Divinity of the promises made to Abraham in the same book. And I believe that, much as those promises have been already fulfilled, they have yet to be more fully fulfilled, and that there is a Providence in the wonderful preservation of the identity of the scattered Jews.

I do not see why we should not believe in the Divine humanity in the Bible, because it is so *humanly* Divine as to be a mixture of light and darkness, error and truth ; the Divine preponderating in the preponderance of light and truth.

So in regard to the New Testament portion of the Bible. I will never believe in the truth of any affirmation of Eternal Punishment. Perish anything in any book that proclaims Eternal Punishment inflicted by One Almighty to save, and whose great attribute is Love, upon His own redeemable children !

I remember thinking when a child how hard it was upon the poor goats that they should be condemned so severely because they happened to be born goats ; which they could not help. And how unfair, comparatively, it was that the sheep should be so immensely blessed and rewarded because they happened to be born sheep, and woolly instead of hairy, which was no merit of theirs. Then I was told that neither sheep nor goats were meant ; and I immediately saw the door wide open and escaped the difficulty by saying that neither was the eternal punishment meant ; and the subject bothered me no more. If two lines of a triangle are false lines there is no triangle at all. And I would rather believe that the Master never used that parable at all than believe that he really proclaimed eternal punishment for the poor goats, whose salvation it was His Divine Mission to secure.

I know that if I had uttered such a thought as this when the Church had power to inflict earthly punishments, it would have sent me through the fire at once, to find out my mistake. What Christianity ! I was thinking that surely no human being, the most heartless, would, if he could, inflict eternal punishment. But, *possibly*, those

so-called Vicars of Christ and His false Apostles would ! Then, were they the descendants of those who invented and interpolated this dark but fiery theory ? Possibly, for they were certainly the sacerdotal successors of those who of old were constantly shedding the blood of men, women, and little children, and burning them as sacrifices to the Sun. And those cruel priests of blood and burning prevailed not only in Asia and Africa and Europe ; but, actually in Ancient America where their terrible altars were in great requisition when Peru and Mexico were first discovered by Europeans. How those sacerdotal butchers contrast with our dear friends the gentle ministers of true and gentle Christianity !—of whom you and I number so many among our dear friends.

And we are now losing, here, as a neighbour, one of the most beloved of such friends in a good Bishop who has been Rector of Stoke-upon-Trent for more than thirty-four years. He came among us two years after I left my native London to live here ; and, as I have mentioned to you before, from the first he has been most beneficent among the people ; and so has his wife ; and so have their daughters gradually grown up to be the great friends and benefactors of their humble sisters among the poor ; who before used to be left so much to themselves unheeded. He and his family can never be replaced here. But their labours of love will continue to be productive. They have sown abundant good seed which will continue to bear good fruit ; and they will now become fresh radiant blessings among the poor in another sphere. I believe they have found their chief happiness in the exercise of the Christian virtues ; their lives having been constantly radiant with light and love ; and God only knows the extent of their secret good work, the evolution of which has been unseen by us. I fear I am too self-willed to be able to confess myself a worthy unit of any man's flock of sheep or lambs ; too self-willed to be guided as a sheep by any man's crook. But I could always love and admire this good Rector and Bishop.

Rambling again ! I cannot help it. And don't want to help it.

LETTER XLVII.

DRUMMOND'S NATURAL LAW IN THE SPIRITUAL WORLD.—NATURE INCLUDES ALL, AND NOTHING IN NATURE CAN BE SUPER-

NATURAL.—BIOGENESIS.—THE PROTOPLASM OF LIFE AND OF DEATH.—FAILURE OF ALL ATTEMPTS TO MANUFACTURE THE PROTOPLASM OF LIFE.—FAREWELL!

18 SEPTEMBER, 1892.



HE next and last section of the Supplemental Chapter is devoted to "Drummond's Natural Law in the Spiritual World," a book which I have never read, but have heard much commended. I have never read it because I never read such books. And had it not been so I should not have read *that*, because I could not see, to begin with, any value in anyone's opinion about Natural Law in the Spiritual World. By the "Spiritual World" is *meant* a supernatural and unknown world, the law in which no man can speak of with a particle of authority, nor without a world of presumption. It reminds me of a book that I have sometimes seen mentioned in old-book catalogues, about angels and their differing degrees and functions ; as exact, presumptuously, as a list of Cabinet Ministers. I don't remember the title. I always pass by that book. But as to the supernatural, you know that I have erased the word from my vocabulary, and I have mentioned the reason why. The spiritual world, so far as we know anything about it, or in this life ever can know anything about it and its laws, is and must be, included in Nature. Our life, our spirit, our everything, is included in Nature ; and the Power which produces, vivifies, and rules all is included in Nature ; and is ever operating in it. We cannot conceive anything above this Power, which is God ; therefore we cannot conceive anything supernatural ; because however wonderful the thing may be, and, so, miraculous in the sense of wonderful, as soon as it is accomplished it becomes, not the supernatural, but the natural ; being included in Nature in which the Power performing it is included. In this sense there is certainly at work "Natural Law in the Spiritual World." But Professor Drummond does not mean it in that sense. If he did the title would be merely such a truism as : "Natural Law in the Natural World." Of course he does not mean that. He seems to mean by the Spiritual World a world outside Nature—supernatural or above Nature. And yet he says : "The facts of the spiritual world are as real to thousands as the facts of the natural world." Here he does not seem to mean something outside

Nature, but quite within it, and quite naturally felt by man. Yet, whatever he may mean, he evidently regards the spiritual as something quite distinct from the natural, and it therefore becomes at once the unknown to our present human intellect ; and any assertion respecting its laws becomes mere presumption, and unworthy of attention. His whole structure must necessarily be worse than cloudy, with worse than cloudy foundations. For clouds are seen and understood, (yes, in two senses,) but this spiritual world which is supposed to be outside Nature, is not seen, nor known, nor can possibly be understood by any man thinking and reasoning in this life, confined to the surface of this earth, with no other vision than earthly life affords. However a man may feel himself existing in a spiritual world, and a spiritual world existing in him, he has no faculty to discover any natural laws in operation in that spiritual world—meaning what Professor Drummond does by natural and spiritual, namely, the physical in distinction from the psychical. Although I hold that the spiritual, so far as we can know anything positive about it, cannot be above Nature, but is within it—essentially within it. That Professor Drummond does not mean this, is clear from his Calvinistic expression quoted on page 349 :

" 'The breath of God *blowing where it listeth*, touching with its mystery of life the dead souls of men, and bearing them across the bridgeless gulf between the natural and the spiritual.' "

And yet the implication seems here to be that there are *dead* souls on the natural side of the gulf, and that only when they are enlivened are they carried across the bridgeless gulf to the spiritual side. It is a muddle ; and both naturally and spiritually so. It is the other side of that bridgeless gulf to which I refer as being beyond our ken from the present natural side. So I shall not review the book, but only glance at Mr. Laing's review of it. And Mr. Laing continues :

" This proposition, he tells us, is, in the first place, made known to us and proved by revelation, and then confirmed by showing that it is the result of the same identical natural laws as those which prevail in the domain of science.

" The law on which he mainly relies is that of biogenesis, which, he says, 'is the fundamental law of life for both the natural and spiritual worlds.'

" Biogenesis means, that as far as is at present known, all life seems to originate from pre-existing life, and that the passage from the inorganic world of dead matter to the organic world of life, is only made in some unexplained way, which implies the intervention of some agency not reducible to known laws of science, and which may be therefore regarded as supernatural. From this he argues that the same supernatural agency must be assumed to continue throughout higher spheres of existence, and bridge the passage from the natural to the spiritual world just as it bridges that from atoms of carbon, oxygen, hydrogen, and nitrogen into protoplasm.

" The first remark is that biogenesis is by no means a demonstrably certain and universal law like that of gravity. It simply amounts to this, that up to the present time no demonstration has been given that life can be produced otherwise than from pre-existing life ; and that certain experiments which appeared to establish the reality of spontaneous generation, have been shown to be fallacious. But the best scientific authorities who have been foremost in detecting the fallacy of these experiments, are also foremost in declaring that as a question of probability and not of positive proof, their belief is that at some earlier stage of the earth's existence, under conditions of heat, pressure, and electricity, different from those we can now produce in our laboratories, this passage from the inorganic to the organic has taken place, and no one would be greatly surprised to hear to-morrow of some experiment by which protoplasm had really been manufactured from chemical elements."

I, for one, should be very greatly surprised, and amazed, to hear to-morrow, or any other day, that any chemical experiment had produced the protoplasm of life. The protoplasm of death would not be worth mentioning. There is plenty of that any day to shew us that protoplasm and life are not one, but two. I have referred to this before. The discovery of protoplasm as the first medium of life known to us has not revealed the secret and mystery of life. We are no nearer to that than if we knew nothing of protoplasm. *In the recently expired the protoplasm is still there, and still warm, but there is no life.*

I do not think it is worthy of Mr. Laing to have written this passage. He counts it as a hopeful authority that those who have utterly failed in their experiments merely *think* that success may be

yet possible. I cannot see how utter failure to accomplish confers special authority to speak as to an unknown past, and future potential accomplishment. This present stage and condition of the earth is emphatically its special stage of protoplasmic life ; and yet our author counts as authoritative an opinion that at some earlier stage of the earth's existence—farther back from its most flourishing life stage, and nearer to its early death stage “conditions of heat, pressure, and electricity” may have been more favourable to spontaneous generation than now. In my humble opinion it must be just the contrary. As regards present protoplasmic life it is more reasonable to suppose that more heat must mean less life, more pressure less life, and also more electricity less life. And also less heat must mean less life, less pressure less life, and less electricity less life. That is the nearest we can tell. The present condition of the earth makes it essentially, to the best of our knowledge, earth's greatest stage of protoplasmic animal life. So the passage is very weak ; but its weakness does not add one fibre of strength to Professor Drummond's case on the whole.

Since writing the foregoing I have reached the end of the Supplemental Chapter to “Modern Science and Modern Thought,” and my task of review has reached its end also, for which I am thankful ; just because I am always anxious to finish any work undertaken. I am also thankful to you for having appointed me the very pleasant labour of writing these letters.

What a rambling progress it has proved !

I will now set about my next task to which you have appointed me, and write on “Primitive Man and his Work,” a subject which seems to arise naturally out of these our foregoing studies. If while I am engaged in writing that fresh series more thoughts should occur which seem to belong to this review, I will add them to it in further supplemental letters. And since you and your friends have so repeatedly expressed the wish that these letters of review should be made into a book, that shall be attended to as soon as I can find leisure to guide them through the press.

LETTER XLVIII.

MORE DIARIAL NOTES ON THE PROGRESS OF LARVÆ AND PUPÆ TO FLIES AND BLOW-FLIES.—THE BAD PASSIONS OF A MAGGOT.—

THE WONDERFUL METAMORPHOSIS WITHIN THE PUPA-CASE.—
THE RESURRECTION TO A LIFE OF JOY AND BLESSING.

31 AUGUST, 1893.



BECAUSE writers on Natural History continue to assert and reprint the old erroneous stories about the origin of the common Fly and the Blow-fly, and I am sometimes told, because of these re-assertions, that it is I who must be wrong in my version of their natural history, I pause in the midst of our researches into the subject of "Primitive Man and his Work," to repeat the experiment which I made in 1888 and described at the commencement of the foregoing series of Review-letters.

And this extremely important subject is worthy to become the Alpha and Omega of that series ; or, indeed, of any much more important series of letters on science. For, startling as it may sound, I find that the existence of the common fly, and, consequently, its mother the blow-fly, is essential to the health, and, probably, even the continued existence, of mankind upon this planet ; to say nothing of all the rest of the warm-blooded species of his fellow-creatures which may be subject to diseases. This is as true of terrestrial fauna as it is true of certain flora that their existence depends upon the Bee ; which, in exchange for the honey of the blossoms, carries and imparts to them impregnation of fecundating pollen.

For confirmation of that alpha of this series, and for the sake of the emphasis of repetition, I commenced the following diarial omega on the 20th of last month when a blow-fly made a deposit of eggs on a piece of flesh which I secured and watched, nothing further happening until—

22nd July, 11 a.m. Found the eggs all hatched, and the larvæ actively feeding. Hatched entirely by the direct influence of the distant sun, shewing, as I have before remarked, that the Creative Ruler of the earth makes the sun His servant and instrument, in ordaining its co-operation with terrestrial agents to bring about all sorts of results in the oneness of supreme government. The sun is the agent of the decomposition of dead organic matter, for the re-utilization of its elements in new life : so is he the agent employed in hatching the tiny protoplasm deposited by the blow-fly in exactly the

right place for its feeding, its growth, its wondrous development, and the accomplishment of important duty all combined ; which, however, the cook will never believe. And thus, by means of the sun's rapid hatching, this dead flesh, supposing the said cook to have no eye to it, shall be more economically and healthfully used by its immediate re-composition in new life, than by slow solar gaseous decomposition. Thus with more convenience to the noses and the health of the living, the sun and the blow-fly are combined agents in changing death to new life—the dead to the living. And the beneficence of the Creator, which is visible in all things that we can understand, is, of course, visible in these natural operations of ordained duty ; which are made, as is general in nature, acts of pleasure to the terrestrial performers. There can be no doubt that the deposition of the eggs was an act of self-gratification or pleasure to the blow-fly. It is ever the object of her eager and, apparently, pleasant researches, to find the food-yielding couches on which to deposit the germs of her future young. And now that these mites are hatched they seem to have only one feeling of ravenous appetite ; and as there is abundance for its gratification, they evidently find pleasure in the act of feeding and the resulting growth.

24th July, 3 p.m. The process of feeding and growth has been incessant and the original piece of raw beef is nearly consumed, the remains being hard and dry. Some of the larvæ were wandering about. I have added a fresh piece of raw beef and they have all returned to the feeding.

25th July, 11 a.m. They are all still actively feeding. The additional food has also become dry and hard outside and they are eating in the interior. I have moistened it with water applied by my finger, considering that in the usual natural way the exposed carrion would be moistened with dews and showers. From the insufficiency of soft food some of the larvæ are now smaller than others, and are pushed aside by the stronger in the struggle for the limited supply. At times there is quite a rolling entangled wrestling between four or five of the stronger ones, and they really seem to be trying to hurt each other. "Struggle for life" after all !

26th July, 11 a.m. There is still a general struggle within the bits of dry flesh ; but some of the smallest have wandered away from it. They have sand in reach, but at present seem to avoid it, from

which I judge that they are not ready for the pupa state, or they would at once bury themselves.

27th July, 11 a.m. All seem to be behaving the same as yesterday. It has been most interesting to watch the struggles and wrestlings to which I have before alluded. Each larva in attacking a fresh piece of flesh commences by eating its way voraciously into the interior, without the slightest consideration for any other member of that large family—exceeding a hundred. Thus each makes its tunnel and eats away its boundaries until the interior becomes one general chamber into which the burrowers tumble together in confused company and in evident anger. For each seems to regard all others as intruders, aggressors, and robbers ; and each seizes another, and is seized, in serpentine grasp. Thus three, four, five, or six of them will roll out of the chamber in one tangled heap ; writhing together, and making active fierce digs at random, at anybody and everybody within reach, with their little black pointed heads. I do not see any wounds inflicted ; but that does not seem to be for want of a will in these sun-hatched little bits of re-animated death. They have, evidently, wonderful ready-made general natures of their own ; which, curiously, include the evil human passions of greed, vindictiveness and hatred. I mean greed not in the sense of mere vigorous appetite resulting in ravenous feeding, but the greed of inhospitality. The ravenous appetite and feeding are a Divine means to a Divine end in the higher life to come ; a life, evidently, happy in itself, but especially beneficent to man and most living things, however much the fly and the blow-fly be misunderstood by the recipients of their blessings, and regarded as nasty plagues to man and beast. You know I have explained all this in previous letters. And the Druids seem to be generally right, so far as we are able to examine and understand the mystery, in their apparently contradictory doctrine, that ‘In creation there is no evil which is not a greater good than evil.’ But so far as this fighting inhospitality is concerned, how remarkable it is that, from a man to a mere maggot, the Divine injunction ‘Love thy neighbour as thyself,’ is equally applicable, because there is in each the natural non-attainment to that Divine standard of love. Although there are of course, happily, many human exceptions—born exceptions. You must know some darling little children—I do—who always insist upon dividing with the household any extra luxury that falls to them.

And if it be only a question of dividing it with one other will always insist on giving the largest half to that other. As to the greedy larvæ, presently the harmless struggle ceases, and the combatants relax and separate—either because they are tired of it, or are too hungry to waste their feeding-time in fruitless fighting—and seek fresh pastures, each for himself alone.

28th July, 11 a.m. The small wanderers of the 26th are probably dead. They have shrunk into a sort of pupa shape, but without the brown case, and as they have not attempted to bury themselves in the sand are probably dead. The others are still feeding in the interiors of the hard pieces of flesh, which have become mere shells. This scarcity of food and hard work of mastication causes much slower growth than in my experiment of 1888, when I kept the larvæ constantly supplied with fresh soft bits. These have eaten some of the fat, which the others avoided.

7 p.m. One very small larva has changed to complete pupa in brown case. As these have all avoided the sand I have replaced it with finely sifted garden mould.

29th July, 11 a.m. The bulk of the larvæ have forsaken the dry shells of flesh and many of them are huddled together in a corner of the card box in which they have been feeding; while some of them still wander about as if seeking for holes, but do not bury themselves in the mould. Others are still slowly feeding on the fat. I have been watching one trying to penetrate the loose mould without success. It has at last hidden itself under the card box. The search seems to be for darkness.

30th July. Away at Rode Heath.

31st July, 2-30 p.m. They seem to have eaten all that was eatable, and most of them are in a great group with very slight movement. I have taken some of the most lively and placed them in another box with a piece of fresh raw beef, to see if they will feed again and become blow-flies.

7 p.m. The last-named are feeding slowly, and the others are becoming still, and shrinking, as if changing to pupæ.

1st August, 11 a.m. Still more of those which had ceased feeding have shrunk to pupa shape, but have not changed colour to any extent. Others are again feeding on the fat, and slowly increasing in size. Those which were placed with a fresh piece of flesh have eaten their

way into its interior, and are at present hidden.

2nd August, 11 a.m. The same.

3rd August, 11 a.m. The same, but pupa cases are darkening in colour.

3 p.m. The piece of flesh which I added for the separate active larvæ on the 31st ulto. has been eaten hollow, and the exterior is dry and hard. I have therefore added a fresh piece which the larvæ have attacked ravenously.

4th August, 11 am. The last supply of food is eaten, and the larvæ are wandering about, but do not bury themselves. Therefore I have added another piece of fresh beef, and they are again ravenously feeding. Of the smaller larvæ in the original card box very few remain active. As I shall be absent until the 8th inst. I have placed a glass shade over them.

8th August, 3 p.m. There are still a very few of the small larvæ on the move under the glass shade, and no flies. Of the larger larvæ, under a wire dish-cover, most have buried themselves in the sand, some being perfected pupæ in reddish brown cases, others less advanced, and others still moving larvæ.

9th August, 3 p.m. A few of the small larvæ are still feeding slowly on the fat. Since yesterday one of them has changed to a pupa larger than any of the others and quite different in shape to any of the others, being more elongated, with raised rings, and pointed at one end like the larva, and of a rich dark brown. One of these appeared in the group of pupæ in 1888, but nothing came of it. Since yesterday many more of the large larvæ have changed to pupæ; all smooth, equal-ended, elongated ovoids, reddish brown.

10th and 11th. Away from Stoke.

12th August, 3 p.m. All the largest under the wire dish-cover are pupæ. And all the smaller are motionless except two or three.

13th. Away from Stoke.

14th, 3 p.m. Found some perfect ordinary house-flies under the glass shade. They are rather small. They evidently have issued from under the card-board box as there are no empty cases exposed. This fully confirms my 1888 observations. The first to give over feeding and change to small pupæ, become small ordinary flies.

15th. No further change. I have separated the large pupæ from the sand and left them exposed under the wire dish-cover.

And now I feel the want of language to express feelings of awe and wonder while I still gaze upon these things and ponder on them—ponder on the silent and motionless creation that is actually going on within these ovoid tombs! So silent and unseen, yet so surely in wondrous progress every moment while I watch—in progress in the dark, all within, except for the vivifying part which the sun's rays perform in warming from without. I have watched the tiny protoplasm deposited by the blow-fly and then instantly forsaken and left to the care of God—how the cook stares with an incredulous expression at the sound and sense, or nonsense, of such words! It was like a mere speck of death deposited upon a couch of death, for it was not life. But while I watched it from without and saw nothing going on, the tiny protoplasm was acquiring marvellous organic structure and power of assimilation; and kindled into active hungry life. And all this was by the mysterious creative law of God, and the agency of the sun's warmth, without the sun's knowledge. Then I watched it eating up and assimilating the mother-selected couch of its birth; and yet another and another, furnished by my hand. And that selection and use of the food-couch of its birth by its mother was merely an act of self-gratification; or, rather, a natural gratification of a pleasurable instinct. It was not the result of any maternal anxiety, or care, or forecast, or even knowledge. She knew nothing of the consequent operations which I am watching—any more than the sun knew of these marvellous operations of the Providence of God! Thus there is a grand Divine Purpose as well as Divine Power in all that we are observing; and the Divine Purpose is not in the sun nor in the blow-fly, which, we may be sure, are merely unconscious agents. Here we have presented to us the awful mystery of Omniscent, Omnipresent, and Omnipotent God. Divine Purpose and Power demonstrated; but still part of Infinite mystery. None can dispute that here we have the evidence of the Power and Provision of God in Nature—His living work. The sun is part of nature and the mother-fly is part of nature, and they are acting agents, but without self-provision and self-purpose; and they are His living work, subject to His beneficent will, and almighty power. But thus far the wonderful work of hatching, feeding and growth, Divine and marvellous as it is, seems to have resulted in a comparatively simple instance of organized life. As a perfected grub it looked a very

simple affair although it had exhibited bad passions—very much like bad human passions. You could almost roll an image of the little creature with a crumb of bread, between your thumb and finger, pointing it at one end, and tipping it with a mite of dirt for a little black head. Still mere bit of squash as it seems to be, without legs or arms, or wings, or beauty of any kind, we have seen that its mystery of life included appetite, inhospitable greediness, anger, and combativeness. And you cannot roll all that into your maggot of bread-crumb between your thumb and finger, with a speck of dirt for a little black angry head and ravenous mouth. Yet, thus far, it has certainly been a very simple organization, as God's organizations go. And even that has now fallen asleep, as in the sleep and sarcophagus of death. Its ravenous appetite and anger are no more ; its muscularity, and activity, and amazing growth, are all still and rigid now in that reddish-brown tomb. And the tombs lie thick like those in a crowded grave-yard. But while we are looking on this scene of change from active life to temporary confined death—seeming still death—the most wondrous recreative work is going on, as I have said, within each pupa tomb. We know that the thing erst like a bit of finger-rolled crumb is being Divinely re-constructed into a totally different piece of organism. Within that pupa-case the dull comatose simple maggot, in spite of its compact tight enclosure, is being re-made into a light, delicate, complex insect : with slender limbs wonderfully jointed and footed : with wings which are astonishing for lightness and strength combined ; and for rapidity of action which enables the wearer to out-race the fastest ship or railway train ; and for such perfection of mechanical evolutionary power that they can swerve, or reverse engine, in a fragment of a second, in exact response to a quick will—a will influenced by the perception of four thousand eyes ; which eyes seem to fill the creature's mind with all the objects of its horizon-enclosed world ; above and below, before and behind, and all around, instantaneously and always—when in the light. All this potentiality of that tiny protoplasmic speck we know will be accomplished within that pupa-case, and that the resurrection of the marvellous creature thus being created therein is sure, it being protected from accidents. We know also, for I have shewn it at the commencement of this series, that the result of this wonderful metamorphosis progressing before us, without self-consciousness of the

change, and without the nursing care of father or mother, is an ordained blessing to the world—a beneficent divine agent of Beneficent Divine Providence.

LETTER XLIX.

NOTHING IS CREATED IN VAIN.—ON THE CARNIVORA AGAIN.—GOD'S
PROVISION OF FOOD.—RULES OF DEVELOPMENT OF FLY-LARVA,
PUPA, AND IMAGO CONFIRMED.—THE PERFECT ENGINERY OF
THE UNTAUGHT FLY.—A CURIOUS NOCTURNAL VISITOR.

3 SEPTEMBER, 1893.



am convinced that nothing is, and that nothing ever was, created in vain ; and also that what may appear to our ignorance as pests and evils, are all divinely and beneficially good in the end ; and that this has been so in all the successive epochs and eras of life on this globe—this speck of gold-dust among the constellations. How vast the Divine Wisdom, Power, and Good of the Whole—in the inconceivable Whole !

Some may argue that these fly-larvæ and pupæ can hardly be things Divinely ordained, with an important Divine mission in creation, because in a natural way so many of the individuals become mere food for birds and other carnivora, and so miss the mission. It is true that the same Divine Power which is now working out the potentialities of the fly in the maggot's pupa-case, has given carnivorous tastes to the carnivora, through which many of the individuals of the larvæ are eaten and never reach their beneficent maturity. But the Creator produces *so much* that He can afford thus to dispose of His Works ; and because He does it, it must be right and wise and good—not evil. In His omnipresence He is as much in the carnivorous bird as in the larva upon which the bird feeds, and which it assimilates and makes a part of its living self ; and it is evidently His will to create this living food as food. And still there is the accomplishment of the original process of change from death to life, however brief the life.

I think I have already shewn that it is evidently the Divine will

and rule that animal life which is most essential to the general terrestrial health and happiness shall yield progeny not only sufficient for the preservation of the species, but in such excess as to furnish food for other species, which are evidently created to consume it as such. It is wonderful how under these circumstances the balance is naturally preserved ; and there is created enough for the food, and enough to survive and fulfil all the duties and destinies of maturity. This is so on the surface of the earth and beneath it, in the sea and in all rivers and lakes, and in the air, and it is also the testimony of the rocks of ages. It is indeed merely the same with the fauna as with the flora of the earth. And thus the oak yields acorns, each acorn a possible germ of a majestic tree, but in such excess of the need of future majestic trees, that vastly more acorns become food for swine than develop into trees ; and the trees fail not. And it is so with apples and pears, containing the seeds of the fruitful apple and pear trees. Their chief destiny is to be food for children and men and women and wasps. But in regard to the wasps I observe that they leave the seed-core untouched, either on the ground or pending in the tree ; while with the larger consumers of the fruit the seed has no chance of germination. And it is the same with our daily bread. Thus when in a natural way these larvæ have ceased feeding and have grown fat, they radiate and wander from the dried remains of the feast seeking crevices or soft places in which to bury themselves. Perhaps there are a hundred in that family, of which seventy-five may be snapped up and eaten, and twenty-five—quite sufficient—may escape and achieve the resurrection. Both those which have been assimilated into the bird, and those which have become flies, have fulfilled their destinies, so far. The original dead corrupting flesh has been changed to healthful life. As I have before remarked.

My reference to the tombs before me in which the wonderful work was going on while I watched and pondered, was to those pupæ which I had separated from the sand in which the larvæ had buried themselves, and they lay spread out under a wire dish-cover, awaiting the resurrection. For I find it to be the rule of the larvæ as soon as they have finished the food before them, to seek a hiding or burial-place, that their metamorphosis may take place in the dark. I presume this act of instinct is for the protection of the remnant that shall escape. The Diary continues :

16th August. More ordinary flies have appeared under glass shade.

17th. Still more, all from small hidden pupa-cases. But two of those hatched to-day, although only the full size of ordinary flies, have blue sheeny bodies. I have observed that the first hatched were the smallest, and the later gradually increased in size, until the fullest size of the house-fly was attained, and two of those out to-day are, as I have said, like very small blue-bottles in appearance.

19th August. Some perfect blow-flies have appeared under the glass-shade, and no more ordinary flies. Also some perfect blow-flies have appeared under the wire dish-cover from the exposed pupæ.

23rd August. Blow-flies have been constantly appearing from the 19th until to-day, and they have been increasing in size until the last are the fullest size. All the cases are now empty except two in which the flies were too weak to extricate themselves and are dead.

Thus the rule which I observed before is now confirmed. The less fed—and therefore the smaller—the larva is, the smaller is the consequent fly, and the soonest perfected from the time of the deposit of the original protoplasm, providing what it has eaten has been eaten within normal time, without difficulty or hindrance. For while the size of the future fly depends upon the quantity eaten, if it be unfavourable food and consumed slowly, its growth will be slower, and the larva condition will be prolonged accordingly, and therefore the metamorphosis delayed, although the fullest size and development may be ultimately attained. But the fly itself never grows. Its final condition is fixed in its first life. The important facts established are these: Under-feeding results in under-sized common flies; full normal feeding brings full-sized common flies; feeding beyond that produces the blue-bottle, or blow-fly—which blow-fly is less abundant than the common fly, because the extra feeding is less common—which is only uttering a truism, because otherwise instead of being extra it would be common. In case I have not already made it clear, let me also add that not only does the more or less feeding result in the greater or less development of the future fly—from smallest to largest common fly, then from smallest to largest blow-fly—but all the eggs of the blow-fly are capable of this development into any and all of the respective stages, according to the feeding of the larvæ. And these statements can be verified by anybody in due season. The appetite

of the larva holds out to the fullest larval development so long as there is food within reach. But as soon as it has reached the larval growth that will produce the full size blow-fly, it will of course, immediately forsake the food and bury itself.

I have only now to make a slight review of the foregoing notes. The small larvæ which I referred to on the 26th July as wandering about, and again on the 28th as motionless, were, as I then supposed, dead. They had not buried themselves, and they only, and always when possible, bury themselves for their resurrection, and not for their death. The single instance of apparent open change to pupa, which I noted on the evening of the 28th, proved to be also a mere case of death with shrinkage and change of colour.

The instance of the larva seeking to bury itself, which I noted on the 29th, proved a successful burial in the mould under the card box ; and not mere seclusion in the shade there. It came up a small common fly, and I found its empty buried case afterwards.

Those larvæ which I noted on the 31st July and 1st to 4th August, as apparently changing to pupæ without burial, were all dead and not pupæ.

The curious exceptional apparent pupa which I noted on 9th August, seemed to evaporate, and left nothing but a very thin, ringed, dark brown skin, not shell, unlike any of the other dead larvæ, or pupæ. One, and one only, of this mysterious thing, has appeared in each of three groups that I have watched from the egg to the fly, and each has evaporated in the same mysterious manner. And the disappearance of the contents of the skin has been rapid, leaving no residue whatever. The other dead ones, although very much smaller when they died, have not thus evaporated. This is at present incomprehensible.

One remarkable thing in connection with the resurrection of the fly and its congeners is that as soon as it emerges from its tomb and becomes inflated, and gets on its feet, it is at once perfect master of all its wonderful mechanism as to walking, and flying, and steering, and reversing engine, with the utmost promptness and exactness according to need. It might be a thoroughly educated engineer with perfect knowledge and control of a most complex aerial machine. He takes in his visible world all around with his four thousand eyes, and his education is instantly complete ; without a moment of ex-

ternal tuition or guidance in his first terrestrial walk or aerial flight. There is not a false step or a stumble from the instant he first finds his legs. Then he tries his wings and is instantly off into society to see life at a rate of super-express speed ; like a fly of long experience just roused from a refreshing nap. It has perfect control of its wondrous machinery, and understands to perfection its delicate steerage at that great speed, however intricate its course among buildings and trees, avoiding all collisions, and never knocking its head against anything but the enchantment of glass window-panes, which its four-thousand-eyed little head can never see nor understand. And from that moment its life is a joy to itself and a blessing to the earth, and its ultimate death very easy. When the flies appear in greatest numbers, it is when there is the greatest amount of enjoyable work for the larvæ and themselves to do—all unconsciously, except as to the enjoyment. Men and women may invent and put in practice schemes for their destruction, not knowing what they do. But, being such needful blessings to the said men and women themselves, beneficent Providence provides them in such countless millions, that the premature death of a few millions, and all that the said men and women can do, will not avail to annul or abate even their own share of the needful blessings.

While I have been writing this by the light of my lamp a visitor has entered through the open window as usual. There are indeed many such visitors, as usual at this season of abundant entomological calls. But the most notable to-night is a special coleopteral visitor—a rather small flying beetle. It has come in with buzzing bustle on an errand of earnest investigation, alighting upon my table with a noisy drop and flop and thereby drawing my attention from this letter to itself. It is a comical looking creature, coming along something like a little tiny black shiny pig towards my lamp, ever and anon stopping to look up at the light. You know these coleoptera have beneath their pair of hard wing-cases or sheaths, a pair of true wings which alone they use in flight, and which being wider and longer than the wing-cases, fold up beneath them when they alight. This fellow has part of these wings projecting, or hanging out behind, like a rag hanging from the holey trousers of a sooty street urchin. So perhaps he rather resembles a little ragged sweep, with shirt hanging out, creeping towards my lamp and me on all fours, than the

little black pig. But he is full of steady purpose. My lamp is shaded with a large green reading-shade, which throws down the light upon the table at the expense of the ceiling and all the rest of the room. Otherwise the scarabæus would have made straight from the window to the flame, instead of alighting on the table and creeping towards my lamp and me in this queer fashion ; for it is this field of light and its source which my visitor has come to investigate. I never before made the acquaintance of such a persevering beetle. After having well traversed the field of reflected light, frequently pausing to look up at the flame, he creeps to the bronze pedestal of the lamp. He goes round and round it, and then attempts to climb this base of the lighthouse ; but tumbles on to his back. He tries again and again, carefully clinging to the ornamental embossments, but fails at least a dozen times ; rolling down upon his back each time. This baffled perseverance is followed by further consideration and the adoption of another plan. Drawing back some inches from the pedestal, he lifts up his black wing-sheaths ; distends his ample wings, and uses them to ascend into the inverted funnel of brightness towards the flame. He alights upon the oil-reservoir, and marches towards the burner. In attempting to climb this he fails, as he did below ; slips and rolls down the sloping reservoir and falls upon the table—always on his back. This upward flight he repeats again and again with remarkable perseverance, sometimes beating against the hot lamp glass to get at the light, but is kept off to his evident mystification by the impenetrable enchantment of the invisible glass, which he batters again and again at least twenty times. I smoke a cigar while he is at it, and meditate upon his truly British perseverance and pluck. And really it is no discredit to him to record, seeing that he is convinced that he is fighting against an enchantment, that he gives in and goes out. Yet whether from disgust at the enchantment, or my cigar, I shall never know. I trust you will not consider his conduct unworthy of this record, reminding you of a similar one of last summer.

LETTER L.

THE DANCING BEAN OF MEXICO.—DIFFERENT ACCOUNTS OF IT.—
THE DIFFERENCE BETWEEN INSTINCTIVE IMPULSE AND DE-
LIBERATIVE GENIUS.

29 DECEMBER, 1894.



THE foregoing proves not to be the omega of this series after all, as I have to write you these further supplemental letters in fulfilment of the promise made in postscript to No. XXIV, when briefly referring to the Mexican Jumping Bean, or Dancing Bean—the *Carpocapsa Saltitans*, or Jumping Fruit-case. In that letter reference had been made to “the marvellous and so effective services which are rendered by so many members of the vegetable world, in the housing, hatching, and nursing, of the helpless progeny left entirely to their fosterage by some insects.” The tree which bears this bean, and the living occupant of the bean, are the most remarkable instances known of this co-operation and active alliance between the vegetable and animal worlds, as you will find in these supplemental letters on the subject.

I mentioned in the said postscript to Letter XXIV, that I had received two of the beans from my friend Mr. Mark Wentworth Goss of Peoria, posted there by him on the 15th of August 1894, received by me at Stoke on the 27th of the same month, and watched every day and every night from that date to the date of the said postscript—the 27th December 1894—as I had carried them with me wherever I went for the night, from Staffordshire to Cheshire and back nearly every week, and sometimes to the seaside.

The mystery of the prolonged unfed active hermit-life within these bean-cases has surprised me more than anything else that I have ever watched and studied in nature. They seem something supernatural; but that cannot be; for anything that is created and is existing within nature cannot be above nature; however great the wonder may be. I have remarked before that the natural, besides including all we see and feel, includes things not yet seen and felt or understood by us, and which therefore would seem unnatural until revealed and experienced. For some days after their arrival I used to think I must be the victim of hallucination, and expected to awake at any moment and find that, behold, it was all a dream. Perhaps it may yet prove to be so; but I must, then, nevertheless, perform my duties of dream-life; and no longer postpone these supplemental letters.

I have regarded it as a positive axiom that no terrestrial life, perceptible by our physical perceptions, can exist without water in some form for its physical medium. I take the expression "born of water and of the spirit" to refer to the aqueous medium of the spirit, or life, in this earthly life. And here is a perfectly sound, hard, opaque bean-case, containing a vigorous creature with strength enough to slide and jerk its ever-closed kennel from place to place, which creature has certainly been in this active existence already for more than five months without a particle of food or a spot of water, and with no apparent means of access and change of air. And the activity is about the same now as at the first, and is expected to last about four or five months longer, under the same conditions.

It is now time to describe these beans as others describe them, before giving the results of my own observations. They were gathered, with many more, in Mexico, and were then jumpers, or would not have been gathered and despatched thence. They were forwarded from Mexico to a merchant who deals in such things in Chicago, who sent these two with others to my friend in Peoria, who posted them to me, as I have said, on the 15th of last August. With the beans came a descriptive leaflet which the merchant supplies with each purchase ; and which I here copy :

"JUMPING BEANS . . . the product of a very peculiar tree that grows in only one State of Mexico. The *Carpocapsa Saltitans*.

"The beans are triangular in shape, having two flat, and one convex surface. Each bean contains a worm that measures about 11 milimetres in length by three in width. They have sixteen well developed feet. The worms live in their shells for nine or ten months, from July or August of each year till April or May of the next.

"If the beans are laid on any flat surface, two kinds of movement will take place. They will be seen to slide forward about an eighth of an inch at a time, and also to jump up from the surface on which they are placed. Each jump raises the bean about one eighth to one quarter of an inch. The first movement is sometimes almost continuous, and the second intermittent ; there is more or less interval between the jumps, sometimes 30 or 40 seconds if the jump has been a particularly strong one.

"The object of these movements has never been definitely de-

cided. The most plausible theory advanced, is that if the worm remains near the tree that produces it, it will be destroyed by some other insect, hence its anxiety to get as far away as possible. The worm has no desire to escape from its shell ; on the contrary it seems to be comfortable only when thoroughly enclosed in it. If a hole is made in the shell, the worm immediately sets to work to repair the damage, and in a very short time will have the hole completely covered with a fine silky web. After this is completed, the worm will act just as before. If the worm is removed from the shell altogether, it will attempt to form another covering for itself.

"The tree on which the beans are grown, produces a berry. Each berry contains three of the beans, but only one bean in each berry contains a worm.

"The most surprising thing in regard to the beans is the fact that there is no hole or other indication of the way in which the worm entered the shell. The only explanation of this fact is that the egg producing the worm was laid in the flower before the berry was produced, and that the berry formed around the egg which later becomes the worm.

"The beans should be kept in a moderately warm place, and should be exposed to the sun for fifteen or twenty minutes every day, especially in the winter. If this is done they will live until April or May.

"For Sale by James H. Wells, N.E. Cor, Jackson St., and Fifth Avenue, Chicago, Ills."

The above appears to me to be a very correct account of these beans, and sensible, except the quotation of somebody's absurd idea that the prisoner-from-birth, who has never seen the world and is utterly blind to it, has acquired the power to drive his ever closed cell about and only exercises that power, through "anxiety" to get away from the shadow of his native tree, lest he be destroyed there by some other insect, of which he can have no possible knowledge nor suspicion ; nor know which way to escape from it if he had. We wont call a bird an insect ; but one would think that the jumping and sliding movements, had the latter been practicable at all on the rough forest floor, would attract sharp inquisitive eyes to the remarkable bean, and cause it far more danger of destruction than if lying perfectly still like any ordinary bean. But the fact seems to be that

when it falls to the earth its locomotion must be of very limited duration ; for it can slide only on a perfectly level surface, or on a decline ; while its utmost jumping power being limited to a quarter-of-an-inch, its locomotion would finally terminate as soon as it found itself in a precipitous depression of even less than an inch, such as might be made by any passing hoof on soft or damp soil, for that would be the final imprisonment of both prison and prisoner. The whole thing remains a mystery ; and I expect to wake up even yet. Still, meanwhile, I must continue to do my dreamland duty if dreamland it be. On the 12th of last month this bean was mentioned in the "London Day by Day" column of the Daily Telegraph in these words : "Another curiosity is added to the many which Nature has already shown us. It takes the form of the 'jumping bean,' from Mexico, and some specimens imported by Messrs. Melchers, Runge, and Co., Fenchurch-avenue, have now been added to the collection of the Royal Botanic Society of London. The beans, which are 'so volatile,' are about the size of large cherry stones, of a triangular form, and contain the larvæ of a peculiar moth, '*carpocapsa saltitans*' How the insect gets inside the bean, which externally shows no hole or defect whatever, is like the question of how the fly got into the amber ; but the idea is that the moth lays its eggs inside the fruit when the latter is young, and the husk then gradually grows over them. If the bean is laid on a flat surface—a table or a plate—it will soon begin to hop and jump, and wriggle from side to side in a most curious manner. These movements are caused by the gyrations of the jumping creature inside."

The larva-of-a-moth idea above mentioned is what some naturalists have decided upon, and it may be correct. But Mr. Wells, with his extensive practical knowledge of the beans from the July of one year to the May of the next, says nothing about that. He describes the worm as living in the same condition and with the same active habit in the bean-case, for ten months and then dying there. Mine have certainly lived with unaltered habit for about five months ; and there is no knowing exactly how long before that they lived in the kernel of the motionless bean-shell in what we should call the egg and larva states, had the latter feeding-state been succeeded by the pupa and the imago ; of which, however, we want evidence. When I say "lived" I mean first in the state of mere vital protoplasm, germ of

life rather than life, then hatched, and feeding upon the fruit—before the case became a hollow dancing case—whereby they grew to their maturity of strength in Mexico in July last, and were captured because they had become evident jumpers, the cell being utterly hollow, and they utterly foodless from that time forth. It seems to me that the egg must have remained a considerable time unhatched. There is no scar on what was always the external convex top, or outside, of both bean and berry, to shew that the fruit had been punctured in its days of young softness, and the egg there inserted by the depositor. There can be no doubt that the egg was deposited in the pistil of the flower and passed thence with and into the elements of the seed; which seed gradually developed around it, and completely enclosed it, while yet an egg. For from the fully developed and sound appearance of the bean-case it would appear that the bean must have been perfectly grown and healthily matured before the hatching took place and the feeding of the young grub upon its kernel commenced. Now if this had been the larva of a moth, or any other fly, all this would have been, thus far, in regular accordance with the natural processes which we have been glancing at in the above-mentioned letter XXIV, where plants housed, hatched, and nursed, the parent-forsaken helpless young of flies. But, to continue the regular accordance, when the bean-kernel had been all consumed and the larva matured in size and strength at the same moment, it should have pierced a hole in its prison wall, come forth into the world, sought a grave or hiding place, and then dozed off and assumed the natural pupa-case—a state of inactivity resembling death in a sarcophagus. In this state no food is required because there is no energetic waste, but only dormant life resembling death; until the resurrection of the perfected winged imago from that bursted tomb. But here, if this creature be a larva that state appears to include the beginning and the end of its existence; the maturity of which, arrived at by feeding, marvellously secures it from the need of any further food; while its energy is daily exercised and wonderfully maintained unabated during ten more months. So far from boring a hole in its prison wall and coming forth, as other larvæ do, it seems to resent such a boring and hint of escape on the part of its friends in the outer world, and stops up any such opening made for it.

I have already had several letters from America respecting these

beans and expect to hear further from Mexico. But there must still remain much uncertainty while the actual origin of the tenant is unauthenticated, and we only believe, but do not know, that an egg of some creature, therefore cannot know what creature, has been deposited in the pistil of the blossom of that tree which is described by Mr. Wells as "a very peculiar tree that grows in only one State in Mexico." An American naturalist writes me of this bean :

"The insect belongs to the order Lepidoptera, sub-order Microlepidoptera, family Tortricidæ, species *Carpocapsa Saltitans*. . . . It belongs to the leaf-rollers, same as *C. pomella*, which infests the plum. All I know of it is that the imago or miller is supposed to lay its eggs in the flowers of the Euphorbia which grows in certain parts of Mexico and New Mexico. This Euphorbia is similar to Cactus, having stubby bare clumps of stems, no leaves, and the flowers spring directly from the stem. The egg being laid in the ovum of the flower, the larva grows up with the pod, and takes possession of one of the seed receptacles, and lives there. The seed capsule always contains three seeds, and, when ripe pops open scattering the seeds some distance. It is said that but one seed in each capsule is ever infected. After passing through its proper stage in the seed, the larva eats through the little web it has spun and passes into the ground (so it is reported) and finally comes out in the spring a tiny miller. This is the history as I get it from people living where it is found. It certainly belongs to a family dangerous to fruit-growers, although it might never adopt their habits if it had the chance. We know insects do adapt themselves to circumstances. And an imported insect is always more dangerous than the native. We have here a native cabbage moth, very similar to the European, but it was never very injurious to our cabbages ; but some of the eggs of the European were brought over in a shipment of cabbages, and have spread all over the country ; and are so bad that whole sections of the country are entirely stripped of cabbages, despite the efforts of the gardeners. The Coddling Moth was introduced into this country by means of a specimen sent to a naturalist. It escaped and he could not get it again. Being a female it went to work, and the result is Coddling moths everywhere. So I thought it worth while to give you a word of caution."

In another communication I get the following : "As to the beans,

I am trying to find out the exact life of the bug. I have to send to New Mexico, for little is known of its habits among scientists at present. All I know now is, the egg is deposited in the pistil, and is taken into one of the seeds ; the larva lives there, eats up the seed, always cutting a hole on one side, which is covered with silk, and stays there. Whether it comes out and goes into the ground is not known. I have opened several, and found a regular dormant chrysalis ; but this may have come from there being no earth for it to go to. I kill them, as the bug belongs to a family quite injurious to fruit. Whatever I get new from New Mexico I will send you."

Mr. Wells implies that they do not make a hole in their case, but stop up such when made by others. My two have made no hole yet.

I do not see how these creatures can be in any degree kindred to the regular leaf-rollers. Their present condition, and reasonably-inferred origin, deny it. First as to origin. There are regular impulses in constant operation in animated nature which operate without thought or knowledge or aim or anticipation of results, on the part of the operators—or, at least, independently of all this ; but which naturally lead to important creative or preservative results ; shewing that the impulses are divinely ordained. The motive of the impulse is a sort of desire, and its accomplishment is the gratification of that desire, which itself assures accomplishment, and is the beneficent part of God's Art of Government ; as I have before repeatedly shewn. Ordinary appetite is one of these natural arrangements whereby a child or a moth take and enjoy proper food for their development and preservation ; without any thought of those results ; and, probably, in utter ignorance of such attendant results ; but they eat in consequence only of the desire and for its gratification. There are also impulses in operation in the attraction of desire for special contacts or depositions ; a desire which doubtless gives also gratification in its fulfilment, the gratification of appetite, if not strictly of appetite as that word is generally understood ; an instance of this would be a mother's rush to her infant to impress its lips with kisses —a very natural general impulse which may have some natural occult result, unknown to the ecstatic kisser or to anybody else. Another instance of this impulse to an affinity would be the selection by the moth of the exactly proper plant and place for the deposition of its eggs for the hatching of the future leaf-rolling larvæ ; of whose future

needs and future clever habits we cannot expect the moth to know anything, or anticipate anything, in yielding to the affinity of egg and ovipositor to plant, and so depositing it in the right place ; since her own similar life was in a previous state, preceding the resurrection from that sarcophagus with wings and all the larva habits utterly changed and presumably forgotten. Her part of this mere act of deposition of eggs in the right place is so different to the highly skilful and highly intelligent work of the carpenter bee or the trap-door spider ; or even to that of her own future leaf-rolling larva-children, whose wonderful work of mantle-making—so different to the mere sequence of appetite—is a sort of work of genius, if ever a costly garment made by tailor-artist for King George the Fourth was such. The work of the leaf-roller in cutting its cloth seems to be only attributable to selective thought, good judgment, and anticipation of results to follow. Genius is the word for it as distinguished from mere Impulse ; and is a very different thing to God-given appetite, and the blind gratification of affinities.

LETTER LI.

INSTINCTIVE AFFINITIES.—“UNCLE PHILIP’S CONVERSATIONS WITH CHILDREN.”—THE LEAF-ROLLING LARVÆ AND MOTHS.—THE JUDGMENT AND GENIUS OF THE LARVA ; AND MERE INSTINCTIVE IMPULSES OF THE MOTH, OR MOTHER.

6 JANUARY, 1895.

N God’s Art of Government in Nature the attractions between appetite and its suitable special food of gratification, and the other special attractions of affinities, of which we have been speaking, and their gratification of contact and union, act in complete and continuous harmony, special and unfailing to the several species to be preserved ; and the art works with wonderful regularity and complete success. Regular and natural instincts bring the right appetite and the right food in contact, and right and special provisions for the future are made by this arrangement. We know that some food which is delightful to one species, and therefore proper for it, is abominable to another, and the instinc-

tive affinities make harmony amidst all these differences ; even to the extent of the maternal provision for the natural tastes and wants of her future young whose hatching she will never witness. This being the case, it is impossible to conceive a mother of leaf-rollers, instead of providing her larvæ with leaves to be rolled, which we know Nature has supplied her with the instinct to do, and which she regularly does—yet acting in this bean instance just in the contrary way, and going in direct opposition to her leaf-rolling instincts. Fancy such a mother being a leaf-roller, yet with a totally opposite instinct to that of a leaf-roller, depositing her eggs each in isolation, in the separate pistils of the blossoms of a tree, which never has any leaves to be rolled ; and if it had, leaves her leaf-rollers no access to them ; but consigns them to an inevitable solitary confinement in a mysterious cell ; so contrary to a leaf-roller's free and open life ; with the world before him in which to exercise his wonderful genius as a tailor. This solitary imprisonment in a dark cell, without even bread and water, and without even the blessing of death—an apparent blessing under such circumstances—seems more worthy of some miserable old Mexican transmigratory soul ; undergoing punishment still, for sins of the pre-Conquest period—sins similar to those cruel fiery idolatrous sins of the ancient Mexicans' more ancient kindred of Asia ; which brought upon them also a similar Conquest by the devastating sword of the Children of Israel.

However, let us be serious, and now glance at the habits of the true leaf-roller larva. And let us remember that whatever creature has deposited the mysterious egg in the pistil of the blossom of the cactus-like Euphorbia tree, has been as God-taught so to do, as the true leaf-roller with her other such very different proceedings : and that the Euphorbia tree has been a party to, and obeyed that purpose of the Creator, which the parent was the mere instinctive instrument of carrying out. And the larva, if larva it be, has found created for it in that bean-case, food just sufficient for its growth and development to what it now is, and has been for the last past five months—a wonderful mystery needing no more food than was provided for it in that solitary ever-closed cell by that Euphorbia tree—a mysterious fellow-creature, not created in vain we may be sure, and by no means a mere moth's failure or mistake. To shew the difference of the hidden life before us to that of the true leaf-roller, and to shew

what I have called the genius of the latter, as compared with the mere instinct of his mother in her imago state, let us glance at the record of its wonderful skill. From my childhood, and especially during that early period of life, I have taken the most lively interest in the marvellously skilful ways of insect workers. And the little book, the same copy, which first guided me in these studies and watchings of insect life, when quite a little child, and caused me even then to call out for a microscope, which became the revealer of wonders—is now in my hand ; and from it I will quote what I know to be quite true ; so it and other quotations will be not only records, but reliable witnesses at the same time, of what might seem to some readers too marvellous for credence. The book is entitled “Uncle Philip’s Conversations with Children,” and was written in the year of my birth. After having described some Bee-tailors, Uncle Philip says to the children :

“ I will now tell you of another little workman, which I have heard called the cloak-maker, because it makes for itself a mantle which really appears very much like a cloak ; and, stranger still, this cloak is lined throughout with silk.”

“ Can it be possible, Uncle Philip ? ”

“ Listen, and you shall hear. These mantle-looking cases are made by the *larva*, as it is called, or grub of a little moth which forms a covering of pure silk ; this silk it spins from itself ; it is not woven so as to appear like our silk, but still it is real silk, and is worked into a great many thin scales, which lap over one another like the scales of a fish. But this is only the lining of the cloak. This little tailor is the *Field-moth*, which first eats what it wants from a green leaf, and then, from the thin membranes left, sets about making its mantle : and it makes it of two pieces cut out and joined together with a seam, just as a tailor would make it.”

“ How does it go to work, Uncle Philip ? ”

“ Why, I will give you the account as it was given by a gentleman [Reaumur] who was very fond of observing insects, and who watched one of these little creatures. He says that from the thin membrane of the leaf it first cut two pieces just equal in size and of exactly the same shape ; each of these pieces was to form one-half of the cloak, and this he says was done wonderfully fast. He noticed, too, that one end of each piece, that which was meant for the bottom of the

cloak, was just twice as long as the other end, which was the top. The insect then placed itself between the two pieces while they were lying flat ; it afterwards brought the two sides where the seam was to be, together, and fastened them at certain places, still leaving, however, considerable spaces open. It then began to turn and twist its body about in all directions, until it moulded the pieces into a hollow form to fit. When it found that it would fit its body, it brought the edges of the seam close together through the whole length, and contrived to sew or fasten them so neatly together, that when the gentleman looked, even with a magnifying glass, he said he could hardly find the seam. The whole was lined with the silk spun from itself, and was finished in about twelve hours."

These leaf-rolling larvæ are also, of course, described in Sir William Jardine's "Naturalist's Library," as well as in all other such works ; but a few quotations from Vol. XXX of this Library will be sufficient for our purpose of endeavouring to shew that these creatures exhibit true sagacity, or mental discernment, as distinguished from mere unknowing impulse, or instinctive affinity. After a description of the tailoring such as Uncle Philip has just given, the writer continues :

"The little dwelling is now complete, but continues attached to the spot where it was formed. In order to disengage it, the insect puts out the anterior part of its body, and fixing its fore-legs to the leaf, drags the case forwards, retaining its hold of it chiefly by the small hooks on the abdominal legs. It is now in a condition to transport itself from one leaf to another, and select the portions best suited to its taste, without incurring the risk, which it seems so much to dread, of exposing itself to the air.

"Apparently with the view of saving themselves the labour of sewing up one of the sides of their domicile, some of these creatures have the sagacity to mine the leaf close to one of the edges, and thus preserve the membrane unbroken on three of its sides. 'Their proceedings,' says one of the authors of the Introduction to Entomology, 'I had the pleasure of witnessing a short time since upon the alders in the Hull Botanic Garden. More ingenious than their brethren, and willing to save the labour of sewing up two sides of their dwellings, they insinuate themselves near the edge of a leaf instead of in its middle. Here they form their excavation, mining into the

very crenatures between the two surfaces of the leaf, which, being joined together at the edge, there form one seam of the case ; and from their dentated figure, give it a very singular appearance, not unlike that of some fishes which have fins on their backs. The opposite side they are necessarily forced to cut and sew up ; but even in this operation, they show an ingenuity and contrivance worthy of admiration.' " Further on the writer continues, still speaking of a leaf-roller :

" Before a caterpillar of this sort commences its operations, it seems to take a survey of the leaf, in order to discover the part best adapted to its purpose. By availing itself of some natural inflection or curvature, such as may generally be found even in the flattest leaves, its labour is sometimes considerably lessened. It then takes up its position nearly midway between the edge of the leaf and the place to which it desires to draw it—the latter being generally the mid-rib, or some one of the principal nervures—and spins a multitude of threads between these two points. These threads are the mechanical means by which the operation is to be accomplished. The curvature once formed, they easily prevent the recoil of the leaf, but it is not so obvious in what manner they cause it to roll up. One of the most philosophical observers that ever laboured in this field of natural history, confesses that he was unable to satisfy himself how this effect was produced, although the operation was going on under his eyes. . . . It is very likely, however, that the thread suffers some contraction as the moisture evaporates by the action of the air, and however slight that contraction may be, that it co-operates with other causes to produce the curvature. The only other means which the insect has been observed to employ, are drawing the threads towards itself by its fore legs, and hanging upon them with the whole weight of its body. These threads are not placed at random, but arranged in small bundles or fascicles, each of which consists of two parallel rows, crossing each other in the centre. When the insect has formed the lower series, it passes to the other side and spins the second, making use of the former, while so doing, as a kind of platform for the support of its body. Its whole weight consequently tends to draw the leaf forwards, while every successive thread of the superior set that is fixed, immediately secures the additional curve gained by the continued pressure. The effect of this mode of proceeding soon

becomes visible in the appearance of the threads ; the lower ones become loose and floating, and those last spun alone continue tight One convolution of the leaf being in this manner secured, the laborious little workman proceeds to form a second, by fixing his cords further back on the bent part of the leaf, and managing them as before. When the last roll is completed, the whole is secured by a series of silken bands, one or two of which are placed at each extremity of the cylinder ; or it is fastened with irregular threads, which form a kind of thin web along the whole extent of the leaf. The caterpillar now takes up its abode in the interior, and finds ample means of subsistence in the internal layers of its dwelling, without injuring the outermost roll ; or if the latter be likewise consumed, it is under the necessity of constructing another tenement. . . .

"The proceedings of different caterpillars, in forming dwellings of this kind, vary considerably ; but the mechanical means which they employ are in most cases similar to the above. Some roll the leaves from the point down the mid-rib, others from the side towards the centre. Many compose their habitations by rolling two leaves together, while others draw the two sides towards each other and convert the whole leaf into a capacious tube. A few, less laborious than their fellows, select the long and nearly parallel leaves which terminate the young shoots of the willow, and very expeditiously adapt them to their own purposes, simply by winding round them a number of silken cords. Such kinds show a wonderful degree of instinctive foresight, in carefully gnawing the bud at the extremity of the shoot, which is enclosed in the centre of the packet, and thereby preventing it from sprouting, as its doing so would have the effect of disarranging the whole tenement, and probably rupturing the bands by which it was held together. . . .

"The larvae which follow the modes of architecture hitherto described, spend their lives in solitude, each confining himself to his own leafy tenement, as closely as a hermit to his cell. Others, however, are of a more social and convivial disposition, and not only feed in company, but form tents which are common to the whole community. These little commonwealths are the off-springs of one mother, originating from eggs which she has deposited in clusters on the plant best adapted to the nourishment of the young. In some cases, as has been already mentioned, the latter continue together

only for a certain time after they are hatched and then separate, probably in order to obtain a more abundant supply of food. But in other instances, it seems essential to their economy that they continue to associate until they reach their perfect condition. Of the former description are the caterpillars, so abundant in some years on fruit trees, which produce a moth of a beautiful snow-white, with the apex of the abdomen bright yellow (*Porthesia Chrysorrhæa*), whose nests may be taken as an example of the kinds generally formed by these family associations. When they first issue from the egg, they arrange themselves side by side in regular lines, two or three deep, and eat their way along the surface of the leaf, advancing simultaneously and with as much regularity as if they were executing a military manœuvre. In this systematic way they speedily consume the leaf for rather more than half its thickness ; leaving, however, untouched the inferior epidermis and the nervures, as these are to form the canvass and cordage, if it may be so expressed, of a portion of their future tent. At an early period some of them may be seen carrying their lines of silk from one side of the leaf to the other, and as these increase in number, the latter, now become thin and pliable, gradually acquires a concave shape. By the aid of additional spinners, the threads are multiplied till they form a continuous web or veil, the silk of which is remarkable for its whiteness. Under this, as a kind of roof, they find shelter from the weather, and make little excursions when in want of additional food.

Now busily convened, upon the bud
That crowns their genial branch, they feast sublime ;
And spread their muslin canopy around,
Pavilioned richer than the proudest kings.

Several leaves, prepared in this manner, are generally necessary to afford accommodation to an entire colony. These slight erections, however, are designed merely for temporary protection, and are all abandoned for one of a more durable construction, in which they pass the winter and continue to dwell all the time they remain in society. This they generally form near the extremity of some of the twigs that afforded them food. It presents, when completed, the appearance of a large packet of silk and leaves rudely interwoven, and of no uniform shape, the latter being regulated entirely by the disposition of the

shoots which support it. The whole colony work busily at this new edifice, and stretch their strong nets in all directions till they have enclosed a sufficient space. The different webs divide the interior of the nest into several compartments of very irregular form, but each of sufficient capacity to contain a number of caterpillars. When the interior is laid open, a number of cells are visible, forming such a complete labyrinth, that it is difficult to comprehend how the larvæ that lodge in the centre find means to reach their quarters. This, however, they are enabled to do by means of doors or passages, which they take care to leave open at convenient places as the structure advances. The texture of these nests is so strong that they withstand all the storms of winter and spring, and protect their little inmates till the beginning of summer, when they disperse in order to undergo their metamorphosis."

I think I have now quoted sufficient evidence of the habits and instincts of the various leaf-rolling larvæ and their mothers to shew how improbable it is that these dancing beans are of the same family : with habits and instincts, both of themselves and their mothers, so different ; and fate so different ; yet with the Euphorbia thoroughly adapted to these different habits and instincts and fate of these its allies ; shewing fitness and divine art and divine adaptation, and not accident. As this letter is already so long, and there is so much more to be said on this mysterious and interesting subject, I will close this and write again later on.

LETTER LII.

MORE AMERICAN ACCOUNTS OF THE DANCING BEAN.—THE MYSTERY OF ITS LIFE.—R. GORDON CUMMING ON AFRICAN ANIMALS WHO DRINK NO WATER—THE ORYX AND ELAND.—THE GREAT CALIFORNIAN TORTOISE.—OBSERVATIONS ON THE DANCING BEAN.

21 MARCH, 1895.



N the 30th December last I received, in a letter from my Peoria friend, further comment on the Dancing Beans and also a cutting from an Illinois newspaper on the same subject. He writes :

"I enclose a newspaper cutting which refers to the beans. It is a very fair statement so far as I know. The point undetermined is whether the larva leaves the bean and goes into the ground. This could be easily determined by putting some earth, sandy soil preferred, in a box, and putting the beans on it, covering over with a glass. I think they do go into the ground. All I have kept have died from being in a paper box. Scientists in this country are interested in them as well as yourself, for really little is known of their life. I don't just see why they are placed among the leaf-rollers, for they live on a plant that has stubby thick leaves that cannot be rolled. Perhaps that is the reason the larva lives in the bean. With the regular leaf-roller the larva attaches a web to one side of the leaf, and, turning its body round and round, makes a roll like a paper lamp-lighter, and makes this his home. *Carpocapsa* has no such good luck. Next fall, if I live, I will get a generous supply of them and send you."

The plan here suggested of placing the beans on loose soil in a box I have adopted and been watching for results. The following is a copy of the cutting from an Illinois newspaper. The "city" referred to I presume to be Peoria :

"THE JUMPING BEAN.

"FUNNY ANTICS OF A SMALL TRIANGULAR-SHAPED SEED. THE CARPOCAPSA SALTITANS SPINS ITS SILKEN CASE WITHIN A SHELL AND THEN RUNS HITHER AND THITHER WITH ITS PECULIAR HOME.

"The sixteen puzzle, pigs in clover and numerous similar toys have had their day in amusing many thousands of the children of larger growth in our great and busy cities, writes A. S. Fuller in American Gardening. Of late a much greater curiosity has made its appearance in the form of little semi-tropical seeds widely known as Mexican jumping beans, and these have taken the place of the older brain-confusing puzzles. For the past two or three months, dignified bankers, brokers, merchants and their associates and customers have been devoting their leisure moments to watching the antics of these triangular-shaped seeds when placed on any smooth surface, and it makes no difference which side up they are, they move along with a jump all the same. These saltatorian curiosities have caught half the business men of the city ; but, fortunately, the craze only affects the cheerful side of human nature, hence is not as depressing as figuring

out one's prospective income tax.

"These little seeds have a history, for thirty-seven years ago a number of them were sent from Mexico to England, and arrived in the autumn of 1857. In some of these, at a later period, the insect was found to have changed to the chrysalis state, and early the following spring the moths appeared. The species was then determined and described in a paper read before the Entomological Society, on 7th of June, 1858, by the eminent entomologist, Prof. J. O. Westwood, who named the insect *Carpocapsa saltitans*. It is a first cousin of our common apple worm *C. pomonella*, but the latter leaves its feeding ground and spins a cocoon elsewhere, while the inhabitant of the jumping seed spins its silken case within, upon which it can hump, bump and jump without injury to delicate little self.

"Some specimens of these seeds were sent to Paris in the same year they were sent to England, and these were exhibited at the Academy of Sciences, but the French savants made a mistake in supposing that the inhabitant of the seed was the larva of a beetle and not of a moth, as had been previously determined by Prof. Westwood.

"The seeds in which these insects are found are evidently the products of plants belonging to the genus *Euphorbia*, which contains about one hundred species indigenous to the United States, mainly inhabiting Texas and westward to the Pacific. There are annual, biennial and perennial species, mostly herbaceous, but some are shrubby with large seeds. It is not to be supposed that the insect under consideration confines itself to any one species any more than the apple moth does to the apple, but the latter attacks all fruits large enough to support its young that belong to the *Pyrus* or apple family.

"Just how the little grub encased in the jumping seeds manages to move them is what puzzles us, for it cannot get a grip upon anything outside; consequently employs some principle of mechanics which has not as yet been fully explained. Shut a man up in a triangular box and he would find it beyond his power to make jumps the full length of his body and carry box and all! but this seems to be a very easy matter with our curious little saltatorian. There are also jumping oak galls produced by a fly (*cynips*) and jumping cocoons, and all probably employ the same means of propulsion."

Here we learn that it was our own great entomologist, Professor Westwood, who classified this Dancing Bean with the leaf-rollers. And because the French Academicians came to a different conclusion, it is concluded that they made a mistake. The slight movement of the oak-gall while the cynips larva is finishing her feeding therein just before coming out for metamorphosis in the outer world, bears no comparison with this ten months dancing, energetic, foodless and waterless imprisoned life of my two little familiar friends whose gambols I am now watching while I write. How they live thus without a supply of moisture for the vehicle of life is an amazing mystery. Yet I feel sure that water still must be the vehicle of their active life—and the matter must be thoroughly looked into—although certainly none in a visible form has come near their closed cells during all these months in which they have been in most energetic activity, which we should expect naturally to require restorative food, and especially water in some form. As to the water there may be many creatures who live without actually drinking water, yet have fluid blood, and obtain the fluid from the juices of their solid food. A remarkable instance of this independence of a supply of water is mentioned by the distinguished hunter R. Gordon Cumming, the kinsman of the Duke of Argyll, in his "Five Years of a Hunter's Life in the Far Interior of South Africa," dedicated to that Duke. He has a deal that is interesting to say about the oryx, or gemsbok, which abounds in the central and western parts of South Africa, and which he describes as "about the most beautiful and remarkable of all the antelope tribe." It is also called the unicorn, although having two horns; but they appear as one when viewed in exact profile. This antelope, which may be seen in numberless herds, is said never to drink water. The hunter-author says: "It thrives and attains high condition in barren regions, where it might be fancied that a locust would not find subsistence, and, burning as is the climate, it is perfectly independent of water, which, from my own observation, and the repeated reports both of the Boers and aborigines, I am convinced it never by any chance tastes." Yet the oryx cows give abundance of milk to their young; and their life flows in the water of their blood. So here is another apparently unsolvable puzzle. Fancy all this being possible in the arid desert of a burning climate, so barren that it might be supposed a locust could not find subsistence there. And

yet these gemsboks live happily there in fat condition with full udders and the usual amount of circulating red blood, and juicy flesh. So there is evidently nothing salamander-like in their nature; and they are evidently subject to the rule which I claim for all terrestrial organised life—that it must have water for its medium. And of course these gemsboks, being abundantly supplied with this water in their bodies, must derive it from somewhere. God's Art in Nature is wonderful in its economic adaptations of all life to its habitat. I remember in one of my letters, as well as in "Cloud Hill," referring to an instance of this in the *Testudo Gigantea*, a tortoise which traverses the Californian desert. The same desert is patched here and there with a sort of oasis of juicy cactus, on which the tardy traveller feeds with avidity when he reaches it. Yet for some reason he does not stay there, but must be always on the go like a Wandering Jew. But these cactus-oases are so far apart, that his feast at one would be insufficient to keep him alive until he reached the next, but for the divine adaptive art, which has furnished him with loose linings or bags on the inner side of his carapace, in which surplus water of the cactus-food is stored; without the knowledge of the tortoise you may be sure; and the traveller is thereby enabled to perform his appointed journeys in his appointed desert. What can all this be but Divine Provision with Divine Purpose? And in the African desert we have the evidence of the modern Nimrod—R. Gordon Cumming, supported by the Boers and the aborigines, that the gemsbok gets along altogether without water, never by any chance tasting it, nor feeding upon juicy herbage, but "in barren regions . . . and burning as is the climate, it is perfectly independent of water." Seeing that they are, nevertheless, well provided with water in their bodies, the difficulty lies only in our want of knowledge of the means of supply—the providing Father's art. And I am sure it will prove the same in the case of these Mexican beans. Dry as the pasture of the oryx may appear there is evidently a supply of moisture somewhere in this its appointed habitat. And there are other folks besides the gemsboks who might boast that they never taste water, but who, nevertheless, get moisture abundantly—too abundantly—of another flavour.

While the California water-mystery, or secret of the slow prolonged travels of the great desert tortoise with insufficient water-supply, is

solved by the discovery of his water-bag linings to his carapace supplied with water from the cactus, so in the African desert there is displayed, or, rather, hidden in the ground, the same Fatherly preparation and purpose in operation. But instead of being a plant above-ground, this African provision is a root, or large oval bulb, varying from six to ten inches in diameter, very juicy, the top of it being eight or nine inches below the surface of the ground, so that it has to be dug up. What minute foliage exists connected with it above, the hunter says is "not easily detected by an inexperienced eye." So here was the secret of the supply of the gemsbok and the eland, which latter also is said to be independent of water. And while this supply is prepared and hidden for them in the desert, they are furnished with instincts both to find it, and to dig or scratch for it—means of labour; as usual in all animated nature.

But our dancing bean has certainly no such resource. It has the appointed labour, and knows what it is to be completely done up with it; and perhaps its consequent rest is the joy of its mysterious solitary life. But its labour earns no guerdon of solid visible food or water. That is certain. But I have come to the conclusion that this mysterious little creature has been divinely provided with means to assimilate from the air its moisture, which that air always contains abundantly in the state of vapour; and I believe it obtains its restorative food, what little it needs, from the same source; for all the elements it needs are there, gaseous, in the same air with the water-vapour. Then the question arises, How can the air with its gaseous food and its water-vapour, get into an air-tight bean-shell, for there is no aperture? Well, the bean-shell is not really air-tight, although there is no aperture. We know that the barometrical pressure of the atmosphere on the earth's surface is very great, and that the air is forced readily through the pores of all nut and bean-shells; and it certainly takes the water-vapour with it. Then the question arises about "change of air"; or, removal of used air and re-supply. This it seems to me, would be naturally brought about by the incessant variations of the atmospheric pressure. When the air is more dense outside the bean, its higher pressure results in greater density inside; and, consequently, fresh supply. And the reverse operation would take place on occasions of lower pressure, with consequent escape outward of stale used air. And it is further my opinion that this jumping or jerking of the cells

assists the operations of forcing the air through the pores of the shells either inward or outward as the case may be. Thus this apparently objectless jerking and locomotion, which in its blind course leads to no goal, may be the appointed labour, labour so universally appointed, which conduces to the health and strength of the inner life. And that labour would be equally productive of such results when the blind progress of the bean had led it into a pit—a deep steep pit of even half-an-inch—from which it could never extricate itself, as when leading blindly on and on, up above, to no goal whatever.

It is now time to mention some of the special results of my very close observation of these remarkable beans during a part of every day, and especially of every night, since I received them, now nearly seven months ago.

In the same way that I am convinced of the operation of the clairvoyant faculty in dogs, more or less, or of some power equal to it, whereby they can go straight to an existing desired object, or place, utterly out of reach of mere physical sight or scent, and by a way never before traversed by them, so I find that the inhabitants of these bean-cases are affected in some mysterious way by influences as subtle and sight-like, not only in the darkness of their cells, but in the double darkness of cell within card-board case. It is not so surprising that they should be influenced by the light of my lamp, as they are every night, and dance before me when placed on the table beneath its rays. Indeed they are more active under this influence than under that of the mid-day sunshine of winter, even when the latter shines upon them in a warm room. But what I find surprising is that they are not only affected by such radiance from my lamp, which makes them active, but they are positively affected in some way by a radiance from the human eye when glanced at, which generally arrests their activity. I had curious evidence of this on the very first day of their arrival by post from America. Up to that time I knew nothing whatever of these beans, except that they had some jumping movement which I had never witnessed. When the parcel was handed to me from the postman I was very busy writing; and, hastily unpacking it, placed the two beans in a card-board jewel-box which was at hand, containing cotton-wool; and placed the closed box on the mantle-piece behind me for observation at leisure, and re-plunged into the subject of my writing. After awhile I was disturbed by a repeated

ticking sound in the room just sufficient to distract my attention from a subject which required perfect concentration. On my turning round to seek the cause it instantly ceased, and all clue was lost. This happened again and again with the like cessation each time I looked round. At last I called in one of the household to listen and watch while I proceeded with my work ; remarking that the disturber, whatever it was, was something which could see us though we could not see it ; like a chirping cricket in a crevice in a wall. This remark caused amusement afterwards when the sound was found, after prolonged watching and listening, to proceed from the jewel-box on the mantle-piece, where the operators were doubly imprisoned in the double darkness of the bean-cases within the closed jewel-case. The beans had been jumping on the wool and knocking their hard backs against the lid of the box, and so producing a ticking sound which I had not the least suspicion came from them. From that day, when either of them has commenced to produce the ticking or clicking sound of movement, whether openly on the table, or shut up in the double darkness of a box, my glance towards them has caused temporary stillness. But, when they have once got into vigorous action without such initial disturbance, they pay less attention to the glance. I can throw no light on this curious fact, but record it for elucidation at some future time of increased knowledge of natural laws. It is further curious, as I have said, that the radiance from the eye should check the activity which the radiance of light excites.

In regard to the activity of the beans under the light of my lamp, I have watched to see whether it arose from an unwelcome excitement or disturbance, or the reverse. Had it been the former I should have expected their movement to have been naturally and generally from the light. But the results of my observations noted down night after night are that they move more often towards the light, sometimes around it and, consequently, much less frequently from it.

Another curious thing is that during the period of the greatest activity of these beans there seems to have been an alternate kind of sympathy and antipathy between them. At times they would approach each other and rest in contact for hours, like two fairy brown dogs curled and sleeping in friendly touch. At such times when I have repeatedly separated them, they have re-approached each other until in apparently gratified contact again. Then, as to the antipathy ; at

other times I have found them reposing as far from each other as the limits of their box would permit ; and when I have repeatedly placed them in contact at such times they have as persistently retired to the opposite poles. This was so noticeable that in my household it was denominated "sulking."

At other times I have been otherwise amused by their ways. They have been so motionless for so long a time, either in sympathy, or in antipathy, or half way between, that I have been in positive anxiety about the state of their health ; when one of them—say M.—has, after all, woke up and begun to slide about in a lively way. In course of time, either by accident or something else, he comes in contact with W. who is still perfectly motionless, and remains so while his companion batters him perseveringly for some minutes, as though to rouse him to come and have a dance. Sometimes he has remained for half-an-hour in motionless resistance to the repetition of these battering attacks ; so that I have thought he must be really dead at last. And then, when both M. and I have given up W. as "no more," —I for my part knowing that he had already been motionless for a whole day previous to this evening's battering invitation to dance—then, when I was about to place them both in darkness for the night —so sorry for W.—that individual has roused up, and accepted the invitation and been ever so lively. So now I have got used to their ways, and am less liable to anxiety on account of them.

But, on searching back page after page I find I have not before spoken to you of my now familiar little friends by name or initial ; and must therefore now explain that when they arrived here in August last from my friend Mr. Mark Wentworth Goss, although they were as like one another as two brother beans generally are, they had and have, like all other things in creation, from the stars of heaven even to the grains of sand of the seashore, their own special distinctive individualities, which I then further distinguished by marking one of them with the letter M in lead-pencil on his brown back, and the other went with the letter W. Had there been a third he would have completed the initials with the letter G.

I spoke just now of occasional anxiety experienced on their account. It is curious that one should be capable of considerable anxiety about the health and spirits of a dancing bean ; but such was often the case until I got used to their whimsical ways, and occasional

abnormal slumbers. But they always compensated me and themselves afterwards by their extra play—really chasing each other about in turns, like two little fairy brown dogs, as I have said before, but more slowly and comically. Now that I have got used to their ways and know they must be drawing to the close of their days, the anxiety has ceased, and given place to mere curiosity.

Thus far there is certainly no death, and the tenants of these bean-cases appear to have undergone no change from larva to pupa state. And whatever their state may be, it appears to last and remain the same from July when they had eaten their houses empty and began to carry them about, until April or May, when they are said by Mr. Wells of Chicago, and others, to die. The surmise that they bore holes in their cases and come forth like the larva of the cynips, to bury themselves for the pupa state and future resurrection and propagation, has no confirmation in my watching thus far. These have made no hole, nor any attempt to bury themselves in their cases in the loose soil on which they have now been placed for many weeks. It still remains to be discovered whether they become pupæ in their cells and then come forth beetles or moths furnished with some instrument wherewith to cut their way out of the case. If beetles they would confirm the report of the French Academicians; and whether beetle or moth would account for propagation; which the life and death in the cell would render impossible, and make them the mere monks and nuns of their species—the altogether exceptional children of their still mysterious parents.

I have taken note that all through the sunny months, and long after this Arctic winter set in, M. was the most active of the two; but since the middle of January M. has become gradually more sluggish and W. has decidedly taken the lead.

I think I have made it clear that these beans, or rather their tenants, are very sensitive to light, whether of the day, or of a lamp at night. But it need not be what we call sensific light of the day. So long as it be day they will be active even shut up in a dark box, as I have said, which is the darkness of cell within cell. But in the darkness of night I have never heard the click of their movement. Yet the light from a lamp placed near them excites them more than the winter mid-day sunshine.

I mention these slight circumstances because they may possibly

add elucidation to future knowledge of these mysterious beans and imprisoned beings. I purpose to continue watching them so long as they exhibit the least movement. After that I purpose leaving them unmolested in their box on the loose soil with a piece of glass for the box-cover, in case later on either moth or beetle should emerge, or anything else unexpected happen in connection with them.

LETTER LIII.

PARTIAL AND IMPERFECT VIEWS OF NATURE.—PADDY'S EXPERIENCE IN A RAILWAY CARRIAGE.—MAGIC.—THE EGYPTIAN MAGI.—THE DESTRUCTION OF THE ROMAN EMPIRE.—THE MODERN GOTHIC MAGI AND THEIR CLAIRVOYANT SCENES AND OTHER WORKS OF MAGIC.—“THE DAILY TELEGRAPH.”—WONDERS NOT WONDERED AT.

24 APRIL, 1895.

E have had occasion again and again to dwell on the misjudgment and false conclusions which we are liable to arrive at in regard to phases of Nature which we mistake for views complete; when they are merely phases, or misleading partial views. It was so in the case of the fossils of “scarp'd cliff and quarried stone”; and “Nature red in tooth and claw.” We are led to misjudgment of the limited view because the greater part of the complete view extends completely out of sight—“Behind the veil, behind the veil”; very properly mentioned twice, because there are two veils, that of the past and that of the future. And we are, besides, apt to misunderstand and misjudge Nature from mere ignorance of the secrets of her current operations; and pronounce things supernatural or impossible, which would be found to be quite natural enough if we had but knowledge enough. While thinking of such things, which are so puzzling, and seem so inconsistent, when they are in perfect order and harmony, I am again reminded of Paddy. If little dogs' ways sometimes puzzle us, so do our ways sometimes puzzle little dogs, especially our railways.

A few days ago a party of four—myself, Adeline and Florence, and Paddy—had occasion to go a short journey by train. Paddy has

often been by train with some of us and likes it amazingly. But he generally curls up for a luxurious nap either on the seat or under it, lulled by the lullaby of the engine, and soothed by the gentle rocking of the carriage. On this occasion, however, he did not yield to the lullaby and rocking of the engine and train, but was very brisk ; and we having the compartment all to ourselves he claimed a corner, and jumped up to one of the windows and looked out ; and as the train was getting up speed, the getting up of his astonishment was most ludicrous to behold. Presently the girls were convulsed with laughter at Paddy's comical amazement and evident bewilderment. He evidently had never seen trees and hedges and houses and banks and fields and canal-locks rushing past like that before. Then to his increased astonishment a great lumbering bridge of brick and stone and iron flew right overhead. Then more trees and hedges and houses and banks and fields went rushing with increasing speed after the others and after one another. Then another heavy bridge of brick and iron flung itself over the train with a sort of leap-frog action in hot pursuit of the previous fugitive and the flying landscape. Paddy looked up with astonishment. He had never seen such goings-on in his life before ; and did not think such things natural ; and could hardly believe his own beautiful brown eyes. His drooping silky ears, too, went up and down—up as an expression of astonishment, and then down, as an expression of Well I never !—while the girls were convulsed ; and I also lost all my gravity, which it is generally hard to find again. Then Paddy looked from the magic window to each of us, to see if we also were on the rush ; then he looked up at the roof and at each of the seats and the floor. Then it evidently occurred to his dog's head that he had seen something slightly resembling this rush past of the trees and hedges before, when he was himself in swift chase of a rabbit ; and he distinctly looked down at his own feet to see if *they* were moving. But, lo, we were all perfectly still except for the convulsions ; and the roof and the seats and the floor were still ; and his own feet were still ; and the carriage itself was evidently still except that the whole train seemed to be adding to the sound of laughter with its attendant slight rolling from side to side. It was too positively evident that it was the outside world only that was running, and still running, this tremendous universal race. For when he looked out again everything had gone madder

than ever. I have before described Paddy sitting on a garden-bench beside me like the Sphinx segant—himself a puzzle. This time he sat before me in the same attitude ; but, instead of being the puzzler he assumed the most ludicrous character of the Sphinx Puzzled. It was indeed funny to watch Paddy's evident bewilderment in the presence of these FACTS. Then he got down and mounted to another window at the opposite end of the seat to see how things were going on there. And there the race seemed only a little madder still than ever. And presently another bridge—this time of stone and iron—leaped overhead with such speed as to promise to overtake everything, and be the winner. Again Paddy's drooping silky ears went up, expressive of astonishment, and then went down expressive of Well I never ! And again he looked at each of us in turn with his bewildered brown eyes ; and up at the roof and at the seats and at the floor and at his own feet. But, lo, we were all perfectly still except for laughter ; and the seats and the floor and his own feet were still ; and the carriage and train seemed still except for the same catching cachinnation and its attendant slight rolling from side to side. So the outside race-past of creation was a doubly confirmed fact. And before Paddy could make anything of it but magic, the magic race began to slacken like a panting exhausted hurricane ; and then things stood still outside, and the carriage door opened, and Paddy leaped out, and stared about at an unfamiliar Station. Now all this was truly magic to Paddy, and he saw the performance with his own eyes ; not on one side of the line only, but on both sides ; just as I have described it. So Paddy believes in magic, having seen it thus in operation with his own eyes ; and yet, like a wise dog, he does not trouble his head to find out how it was all done, and build up baseless theories on the subject. But when he looked around at the unfamiliar station, and saw all things still that should be still—and the train still also, as he found it to be when the magic race was going on outside—he set up a series of loud barks which we failed to interpret. And he kept up that loud expression of his opinion, whatever it was, until he had got quite clear of that enchanted train and station and scenery ; and forgot his bother in the naturalness of the gamey lanes and fields. And please accept this mental echo of that musical voice, as Paddy's final farewell to you in this series.

I think I have made it clear in these letters that the word "super-

natural " is completely erased from my vocabulary ; because we cannot possibly know what can be *above* Nature, since Nature includes the Power of God within itself. And because whatever might have been thought to be supernatural, should it ever happen in Nature, becomes at once evidently natural ; being not *above* Nature, but within it ; although we had not thought so before seeing or feeling it. I think I have also made it clear that the word "miraculous" is established in my vocabulary with its amplest signification of WONDERFUL ; since we find the very wonderful to be the terminus of every investigation we undertake. No miracle ever described, and doubted or denied as too wonderful, is more wonderful than Nature's own revelations to our researches. There we find wonders ever, ultimately, too vast for our mental comprehension. Even as this earth of nearly twenty-five thousand miles circumference is a true and wonderful fact, although we cannot mentally grasp that magnitude ; minute speck as it is in the cosmos. And I want now to be permitted to have a little chat about Magic, which subject Paddy has so grotesquely introduced to our thoughts ; that I may try to convert you to a belief in that also.

A great many people have so religious an objection to the word "miraculous" that the mere mention of it sours their tempers ; while others have as religious a belief in it, and are equally soured at the word "magic." Such people would turn away without listening to me ; but as you are so kindly patient I am going to try my best to make you believe in the magical as well as the miraculous. It all depends upon seeing magic performed before one's own eyes, and then either learning or not learning how it is done. It is just as much magic, if magic at all, whether we learn that or not ; for however it be done there must be some mode of operation, whether by means of the true human magician, or by means of invisible powers such as angels, or devils, or genii. And I shall go in for invisible powers and the true human magician combined.

The magi are generally described as the priests of the Medes and Persians ; but we find that they were established in Egypt in the days of Moses and Aaron ; and they and Moses and Aaron competed in their magical exhibitions before Pharaoh. How the Egyptian magi managed to do what they are stated to have done, I shall not try to find out. The changing of dry sticks to living serpents is not the sort of magic I care to investigate, because I don't see any utility in

it when one has learned the trick. Perhaps it is all esoteric, like the first part of Genesis ; and means something wise and good, after all, to the initiated ; as the serpent was indeed symbolic of wisdom. Perhaps it meant an exhibition and competition of wisdom before Pharaoh, when the wisdom of Moses and Aaron swallowed up that of all the magi. I should not wonder. But in the magic which we are about to examine, as in Paddy's magic, there are no rod-serpents, nor blood-rivers, nor frog-swarms. So that account of those doings of the Egyptian magi need not cause us any anxiety at this time to learn whether the whole story is mere sacerdotal esotericism, like the beginning of Genesis, or what.

It is curious to learn that some of the descendants of the races of barbarians who overthrew the ancient Roman Empire, are excellent magicians at this day. And it is curious to reflect that, in the case of the Romans, that enormous educational heredity to which some philosophers attribute so much of human evolutionary progress—in fact the very making of man himself out of a monkey, through the monkey's own self-improvements and their heredity—it is curious that this heredity of mental and physical ruling might, and of civilization, should have failed to prevent that collapse of the great empire ; and that the law of the survival of the fittest with the heredities, in that imperial sense, should have been suddenly broken, or the great inheritors become suddenly the unfittest, in spite of all their heredities, before the less effective arms, and the more rude manly energies of these Gothic barbarians and their allies. They, indeed, without the immense heredities of the Romans and their Greek allies, which were handed down from the ancient Egyptians to the Greeks, and from the Trojans and others to the Romans—they, the Gothic barbarians, very quickly, comparatively, evolved the noblest qualities of mental and physical manhood, without any far-back educational heredity of development as distinguished from mere potentiality ; barbarians as they were ; and became the lordly rulers and leaders of the earth in all manly attributes.

We have now, however, only to do with those of their descendants, or kinship, who are said to have involved and evolved the functions of the magus, and have obtained the control of mighty visible and invisible agents to do their magic bidding at this very day ; and, by the aid of magical figures and signs accomplish far greater wonders

than were ever performed by their predecessors of ancient Egypt, Media, and Persia. And they are said to differ from the ancient magi in exercising their wonderful powers for the service and benefit of mankind generally, instead of merely "showing-off" like a conjuring showman, and that, possibly, before the showman's mere dupes. And it appears that the functions of the Gothic magi include a sort of clairvoyance which, although differing certainly and entirely from that of the dog, is no less wonderful ; perhaps much more so.

These Gothic magi possess the art—and it must be miraculous—of presenting, or depicting, in the homes of their friends, or in the minds of anyone with whom their magic operates—thousands of miles away, even to the most distant parts of the earth—tableaux of the scenes and events with which they are themselves surrounded, or of scenes and events which have just happened thousands of miles away from themselves and are communicated to them by others, by the same magic clairvoyance. By this means, or their control of invisible power, the most vivid scenes are presented to the mental view of people, as I have said, as far away from one another as it is possible to get on this earth ; and almost with the rapidity of thought—whether the scenes be of a domestic character, or of battles, or earthquakes, or shipwrecks, or great fires, or anything in the world that is truly happening therein. But if ever these Gothic magi present a picture of a serpent devouring serpents, it is simply that of the serpent-mother swallowing her young for their own protection ; and not one dry stick swallowing other dry sticks for no good purpose at all. Of course this latter must be esoteric ; and these descendants of the ancient Goths do not resort to any sacerdotal esoterisms of that sort ; although I am informed that they do very extensively in this magic art employ an esotericism not at all sacerdotal ; but of quite another very widely useful sort ; so that any groups of friends may keep among themselves any secrets which are very properly their own.

Then, further, as to the power which the ancient magi are said to have possessed of changing a dry stick into a moving serpent, the Gothic magi are credited with a power and skill in animating the inanimate, and even inorganic, compared to which the stick trick is as nothing. I remember some years ago having occasion to quote to you from Homer a passage in which reference is made to the magic

skill of the god Vulcan in making things in metal for the furniture of his own Olympian palace. When Thetis, the goddess-mother of Achilles visited him—Vulcan—on that occasion he was engaged in finishing—with the handles, if I remember rightly—twenty tripods, in bronze I presume, which had wheels; and the magic power of wheeling themselves about from place to place. Now this divine magical work of Vulcan, I believe, is as nothing compared to the wonderful animated things in metals which the Gothic magi produce by their magic art in these very days of ours—a wonderful magic art such as the magi who conjured before Pharaoh would have pronounced too absurdly impossible for any magician in the world to acquire at any time.

But to return to the clairvoyant pictures of the Gothic magi of the present day, the most wonderful part of their art appears to be the facile power which they possess of transmitting these magic tableaux in repetition, into the interiors of any number of hundreds of thousands of homes of a nation or nations, within a few hours of the occurrence of the real scene or event in no matter what distant part of the earth. This certainly beats any magic ever ascribed to the magi of Egypt or Media or Persia; from the days of Moses and Aaron to those of Cyrus; wonderful indeed as were the feats ascribed to the magic of those magicians. And, then, this of the Gothic magi is so much more useful and instructive and enlightening as well as more marvellous.

And it appears that there is really no trickery whatever about these wonderful feats of the Gothic magi of the present day. And there is nothing even esoteric in the working of any branch of their magic, if it be true, as I am assured, that it is all open to the view and analysis of all who choose to be initiated. And I have already observed that true magic is just as much magic whether we can learn exactly how it is done or not; and whether it be the outcome of the true human genius of the true magus, commander of invisible power in Nature, or by means of invisible angels or devils or genii. And I have already said that I shall go in for invisible power and the wisdom of the true human magus combined.

I have not personally sought initiation in all the arts of the Gothic magi, but am very familiar with their magic tableaux, and have some of them glowing, like the real scenes which they represent, in my own

house nearly every day. And the beauty of the Gothic arrangement is that if the pictures be communicated to my house in the morning, and I am too busy to look at them, they keep without any loss of colour or definition, even until the leisure of midnight, if necessary. These pictures are presented on sheets, and their preservation thereon is due to a complex number of potent magic signs which the Gothic magi use. And some other potent magic signs they employ in the first clairvoyant exhibition of these pictures, with mighty and swift invisible agents to carry them round and about the earth—so swift as to be almost as quick as thought itself, and so mighty as to be able to overthrow the mightiest works of man, and deal instant death to man himself, or to the fiercest beast, or to the strongest elephant. Yet the Gothic magi so completely control these mighty powers in connection with this their magic, as to make them their strictly obedient carriers of the magic signs which produce the clairvoyant tableaux in many far distant lands.

As to the magic pictures which we find depicted on the sheets in our own homes. I found one in my house this morning, portraying events which had happened, some of them, only a few hours ago in many distant parts of the earth. I think I have not mentioned that in these pictures the most vivid living light, when it belongs to the scene, is represented in full glow and play ; and darkness also plays its part in full density without concealing the details of the scene which it covers ; and even sound is nearly as distinctly revealed to the mind by this magic as if admitted through the ear. Thus it is in one of to-day's pictures, or, rather, in two of them, for one brilliant meteorite is pictured from two places, or points of view. I have already written to you about the meteorites or shooting stars, and have myself seen, on two or three occasions, such as was seen a few hours ago, and clairvoyantly pictured only a few hours ago, both from Pau and San Sebastian ; many hundreds of miles away from here. And here before me are the two pictures of the one great shooting star passing swiftly across the sky, a great brilliant light, streaming a trail of sparks of its own burning self behind it ; then falling with a loud report as of thunder among the Pyrenees.

Then there is another living picture before me on this same sheet ; and, curiously enough, also with light and darkness and the sound as of thunder in it ; to which I would like to refer. But as it is con-

nected with another tableau which was presented a few days ago by the same Gothic magi, I will, if you please, refer to that first, and then to this morning's further picture of the same scene, in proper sequence. The former picture was presented by the magi on the fifteenth of this month, and represented the scene from one point of view, while the sequential picture represents it, as I have said, from another point, which is another coincidence. It was night also, and in a very mountainous country ; with a broadish rapid river flowing through it, over which a bridge had been hastily constructed by a brigade of an army invading those hills and passes to punish offenders. A portion of the van, or the infantry of the Corps of Guides of the brigade had crossed the bridge and encamped opposite to their comrades, so as to start early in the morning on a punitive expedition against some villages near at hand. During the night large logs were represented coming down the river and smashing the bridge over which the Guides had passed ; and so destroying their contact with their comrades on the other side. Nevertheless we saw by the light of the morning that, although thus cut off from the support of their brigade, these fearless Guides advanced to execute their errand against neighbouring hostile villages ; after which they pressed forward toward the hills in search of other foes. Towards mid-day they discovered two large bodies of hostile tribesmen advancing towards them. Before those very superior numbers of daring Pathans it was found prudent to retire, and the picture represented a spirited battle kept up during every step of that cool, slow, and masterly retreat towards the river, in the face of overwhelming numbers of the enemy, during which the latter suffered severely. At length when the river-bank was nearly reached and the pressing hillmen were being shelled from the opposite bank, and the Guides were safe, their gallant commander was struck by a bullet and fell dead at the head of his men.

This picture of strife on the North-West frontier of distant India was clairvoyantly conveyed thence by the Gothic magi to Simla, on the day of its occurrence, which was the thirteenth of this month. From Simla it was conveyed by other Gothic magi on the fourteenth, and on Monday morning, the fifteenth, I found it exhibited on the sheet in my house, without any fetching or trouble on the part of any of my household, the numerous tableaux being all conveyed into the interior through a small slit in one of the outer doors provided for

the purpose.

Now we come to the second picture of the same event from another point of view. This was conveyed later on, on the scene of strife, by a wounded Pathan prisoner, to the Gothic magi accompanying the army ; and I find it presented on the sheet in my house this morning, with the two pictures of the shooting star ; and a great many more. In it we see the hillmen watching from the hill-tops the movements of the invading force below. They watch the construction of the bridge, and afterwards reconnoitre as closely as they dare the entrenched camp of the Guides' infantry. Then the brilliant idea struck their chief of launching the heavy logs up stream to wreck the bridge in their impetuous passage down stream. The hillmen watch the launching of the great logs, and the destruction of the bridge and the sweeping away of its fragments by the rapid flood, and signal the hopeful news from hill to hill ; and the clans gather with speed. Then the Mullahs arise among them and preach the righteousness of their cause ; and, pointing to the camp of the separated Guides assure the hillmen that Allah is mindful of his children in thus placing one thousand rifles and much ammunition within their hands to grasp. And as they so sorely wanted those rifles the words of the Mullahs excited them greatly. It is now morning and they perceive the Guides marching towards them from the bridgeless river-bank, and the hillmen rejoice believing their own victory to be certain, as their Mullahs had assured them ; and they hasten towards the advancing enemy through the passes and over the hills. At about mid-day the hostile parties arrive within gunshot of each other. Then the commander of the Guides, seeing his followers so greatly outnumbered by the brave and determined hillmen, halts and slowly retires, manoeuvring a battle during all that steady retreat. Or, as the wounded Pathan relates in his word-picture, which the Gothic magi have communicated to us clairvoyantly by their magic :

"When they [the Guides] saw us they went back slowly, and we could never get close to them, for some of their guns were always firing against us, and many were stricken and fell. When the men had reached their camp, and the Sahibs across the river commenced firing upon us, too, we went back to the hills for shelter.

"Then our Mullahs and chiefs talked together and decided that we should creep upon our enemies in the night, and fall on them

when the night was darkest. And every man went willingly for the guns we badly wanted.

“There were 2,000 hillmen who set forth that night to crawl up to the soldiers’ camp. We lay four hours in the wet fields, with the rain falling steadily, waiting for our chiefs to give the signal for the great rush.

“Word came round from chief to chief to be ready, and every man crouched grasping his weapon to run forward. But at that very moment a devil’s gun boomed forth, and lo, instead of bullets and balls coming out, there burst over us a mighty light, so great that we thought the night had suddenly become day. And we cried aloud to Allah to abate his wrath against us, and when the great light faded we all hurried away, and even our Mullahs had no word to say.”

The magic picture on the sheet then exhibits the star-shell fired from the camp as containing and igniting a brilliant magnesium lamp which vividly illuminates the surrounding country to guard against any nocturnal attempt to rush a position. This is another trick of the Gothic magi which those of ancient Egypt, Media, and Persia, never, I believe, attained to.

Now it might very naturally be thought to be a very expensive luxury thus to have the magic pictures of the Gothic magi sent from all parts of the earth where anything very special is going on and worth watching, and fixed in my house without having to go out of doors to look at them, or to fetch them, or to send a messenger for them ; and all depicted on a fresh sheet daily. But all this wonderful daily magic is so cheap, that its daily cost to me is only One Penny ; which is an evidence that it is true magic. I have spoken of the modern magi as Gothic because the Scandinavian Goths were probably the parent stock of all modern Teutonic peoples ; who are now distant cousins ; even including the descendants of those Gothic Franks who changed the name of Gaul to France, and including these magi.

My magic pictures are on the sheets of *The Daily Telegraph*. I well remember those sheets being started as a so-called Liberal paper when I was a Conservative youth in London. I remember taking a fancy to it the first day of its publication, and remarking to friends that I found it more interesting to hear and watch the sayings and doings of the best intelligence of the opposite party, than to labour

through mere reflections and reiterations of one's own thoughts and opinions. And as I have never found time to read two daily papers I have habitually neglected all but *The Daily Telegraph*, which has long been as conservative as I can ever wish, and as well written and instructive in the affairs of the world as ever ; or, I should say, in its accumulation and daily exhibition of the world's pictures by the Gothic magi.

We have been dwelling upon the developments and capacities of human genius, and claiming that in its range and accumulative effects it far surpasses that of all man's fellow-creatures ; wonderful as are the respective geniuses of the leaf-rollers, the carpenter bees, the trap-door spiders, and all the hosts of work-folk, who long preceded man in their active industries upon this planet, which he now claims as especially his own great workshop, and in which he is indeed the great master worker. I was thinking of these things this morning when glancing at the sheets of *The Daily Telegraph*, and its evidences of the wonderful development of that human genius in the daily production of its magic pictures of the world's doings and experiences of yesterday : of extraordinary natural phenomena in the way of meteors or earthquakes ; of the acts of persons and nations ; of declarations of wars, of battles, and peace-makings ; of robberies, and murders and executions ; of the doings and sayings of great men, and the treacherous combinations of little men ; of disasters by fire, collisions on railways, explosions, and shipwrecks. And there are reported the births, marriages, and deaths of princes and princesses as well as of ordinary people ; and the cries of merchants offering their things ; and the cries of ship and railway and insurance companies ; and, Oh, such a deafening noise besides ! Let us get out of the din, and confine our attention to the acts and events of the world only a few hours old, flashed by man's wonderful succession to the control of Jove's lightning—controlled and directed without its slightest resistance, or murmur, or faintest rumble of thunder ; and made the obedient bearer of the pictures which are so faithfully presented on sheets delivered at one's own home, through a slit in a door, and at hundreds of thousands of homes, all for one penny. When you ponder on this I am sure you will become a believer in the modern magi and the truth of their magic. We get so used to the wonders resulting from the education and expansion of human

genius, that we cease to wonder at the genie-work, until by pondering we become reminded of the evident reality of human magic. For the means discovered and applied by the divine human genius for filling our minds so vividly with these tableaux of events, which happened a few hours ago all over the world, is as wonderful as any other magic representations of the same scenes could possibly be ; and as wonderful as any other sort of clairvoyance. But we usually take up our Daily without thinking of these things.

We have, as I have just hinted, become so used to the wonderful as not to wonder at it. But with the majority even the greatest marvels of all, that we can investigate, have never been marvellous at all, for want of observation and thought. This is especially the case in regard to our very selves—so common that we do not stay to examine ourselves and to ponder on the theme, so as to realize the wondrousness of our functions and capabilities. To do this we need, in a manner, to come out of ourselves, mentally to view and appreciate our make and faculties. This thought is still in connection with the Gothic magic, and I am more especially thinking of the eye and its wonderful faculty of sight. It takes some thinking, but is well worth all the thinking, to realize the natural magic of the passage of the images of surrounding material Nature into the mind through the eye—all the varied forms and movements and colours and magnitudes. Simple as it may seem to the simple, it is all too wonderful to be understood by the wisest and deepest thinker, how the mere glance of your neighbour conveys into his mind your complete life-size image and the whole of your surroundings, including the big mountain in the background, and the sky above. And that same picture, communicated instantaneously through that glance of the eye, can be recalled again and again for years to come when the eye and mind of that neighbour are a diameter of the earth distant from you. What magic can be more magical than that ? And that is purely natural magic.

Then there is another wonder connected with the human eye and mind, which the majority never wonder at for want of thinking. That is, that scenery and events not present, and never actually seen nor heard of before, should likewise be capable of transmission into the mind in vivid images, by means of mere external signs presented to the eye ; which signs bear no resemblance whatever to the images

produced, neither in form, colour, nor anything ; but are what would indeed be to the uninitiated mere hidden magic ; or cabalistic signs in black or gold or silver or anything. This is only a repetition of a part of what we have already been dwelling upon and wondering at, in the doings of the Gothic magi ; less wonderful than their transmission of signs, as full of meaning and truthful revelation, by lightning messengers. But I have used this repetition with the view to draw attention to a marvel of magic art, which, because it is so common a human faculty is not marvelled at ; although the faculty is common to man alone. In the mere eye-sight pictures we have the wonderful magic of Divine Nature, which is in universal operation ; while in the eye-sign pictures we have the human magic—still Nature's own potentiality, inborn in man only, so far as we know. For the faculty is not in the remotest degree a potentiality of the monkey ; and therefore he never gets beyond his present monkeyhood ; and not having done so thus far, we may reasonably conclude that he never will in his monkey life.

Then there is yet another wonder connected with the human mind and its pictures, and that, I believe, is especially a development of the art of the modern magi. And this wonder is most of all wondered at, because not so common as the others. And that is, the magic of filling the human mind with glorious pictures by means of mere manual touches, without any eye-sight or eye-signs at all. That marvellous magic we have fully discussed in the case of dear good Helen Keller of wicked Texas. And observe how impossible it would be to apply this manual-touch magic means of imparting glorious pictures to the mind, in the case of the very cleverest and most receptive deaf and dumb blind monkey !

LETTER LIV.

A PERSIAN TALE, BEING "THE HISTORY OF KING RUZVANSCHAD
AND OF THE PRINCESS CHEHERISTANY."

1 MAY 1895.



WHILE writing the foregoing letters my mind has been frequently recalling and dwelling upon an old Persian Tale which I read and so appreciated in my childhood that it has never been forgotten. Now that we have

got thus far it seems to me that the tale will be a suitable addition to the mosaic-work of these letters, being entertainingly illustrative of some of the thoughts which we have had again and again under consideration in them. Therefore, while the printer still permits, I will now ask your permission to embody it in a letter; as the book entitled "Persian Tales" is still at hand in my library. The story will need no further comment from me, as its fitness to form an illustrative and parabolic addition to this collection will become manifest in itself. It is:

THE HISTORY OF KING RUZVANSCHAD AND OF THE PRINCESS CHEHERISTANY.

There was a King of China, whose name was Ruzvanschad. He went one day a hunting, and he happened to meet with a white doe, beautifully sprinkled with blue and black spots, with rings of gold upon her feet, and upon her back a yellow satin, bordered round with embroidery of silver.

At this extraordinary sight, the Prince expressed an eagerness to pursue the game, and put his horse to the full speed in hopes of taking the doe; but she eluded his pursuit, and fled with such incredible swiftness, that he soon lost sight even of the dust she raised by the rapidity of her flight. He now lost all hopes of ever seeing her again, and was very much mortified with the thoughts of his ill-fortune, when she presented herself to his eyes a second time: he discovered her lying upon the grass near a fountain, where she seemed to rest herself after the fatigue of her chase. He put his horse again to the speed, but his efforts to take her were vain. The doe, seeing him now near at hand, raised herself lightly, and bounding two or three times from the ground, she plunged into the water and disappeared.

The King of China leaped instantly from his horse; he runs, he fatigues himself, and takes a great many turns about the fountain; he stirs up the water, and searches for his prey to the very bottom; but finding no appearance of it, he remains deeply astonished with the adventure. His Vizier and his other attendance were no less surprised. The King, after several reflections with himself, said, that he could not imagine what he saw was in reality a wild doe; but rather some nymph, who, under that shape, took a pleasure in

deluding hunters. His courtiers were of the same opinion.

In the meantime, Ruzvanschad could not disengage his eyes from the fountain ; and sighs, which he could not account for, from time to time rose within his breast. I am resolved, said he to his Vizier, to pass the night here ; my curiosity obliges me to watch this nymph, and something whispers me, methinks, that I shall see her rise out of the water. This resolution taken, he sent back his whole retinue, excepting the Vizier : they sat themselves down upon the grass, and continued talking of the white doe till night came on. Then the King, fatigued with his chase, was inclined to take a little rest. Muezin, says he to his Vizier, I can hold up no longer ; watch you while I sleep. Never take your eyes off from the fountain ; and if any thing appears, be sure you awaken me. Muezin, though very much tired, watched awhile to please the King ; but at last, overpowered with drowsiness, he fell asleep, notwithstanding his endeavours to the contrary.

Their slumbers were of no long durance. Awaking both at a time, they started up at the sound of a ravishing symphony, that seemed not far from them ; and, to complete their astonishment, they saw just before them a very magnificent palace illuminated, which seemed to be raised by some power more than human. Muezin, says the King, in a low voice, what can this mean ? what concert is it that strikes our ears ? what palace presents itself to our eyes ? Sir, replies the Vizier, all this, without doubt, is something more than natural ; it must be enchantment. Would to Heaven we had abandoned this fountain : this palace is perhaps a snare laid by some magician for your Majesty. Be it what it may, says the Prince, think not that I will turn back out of fear. Let us march up to the palace, and see what kind of inhabitants there are. Seek not to terrify me by presaging ill omens : the more you represent to me of dangers, the greater will be my desire to attempt them.

The Vizier, seeing his master determined to run all hazards, did not dare to oppose himself any farther to his inclinations. They went both directly up to the palace ; and now, arriving at the gates, they found them open. They entered into a hall floored with China, and furnished out with sofas and tapestry of gold brocade, and perfumed with the richest odours. They crossed over this hall, where they saw nobody, and went into another, in which, upon a throne of

gold, sat a young lady covered with jewels, the brightness of whose beauty surprised them.

She seemed to give strict attention to fifty or sixty damsels, of which some sung and others played upon the lute. They were all in habits of a rose-coloured taffita, thick sown with pearls, and stood up before the throne. Ruzvanschad never heard finer voices nor more moving music ; notwithstanding which, he was wholly taken up with the lady, who sat upon the throne.

When the damsels perceived this Prince, they put a stop to their music. He made a profound reverence, and advancing into the middle of the hall, he addressed himself in the following speech to the lady :—O charming Princess, ruler of hearts, the very sight of whom has added to the number of your slaves the sovereign Lord of China ; let me humbly desire to know the name of so wondrous a nymph, whose beauty bears so irresistible a power ! The lady smiled at these words, and made answer—I am a doe, who lead lions captive ; I am the prey which you this day pursued, and which plunged itself into the fountain. But, Madam, says the Prince, what am I to think of these miraculous changes ? my love is alarmed at them. How can I be satisfied that what I now see is not a false appearance ? No, replies the lady ; I shew myself now to you in my natural shape. It is true that I change my form when I please. I shew myself to men, and vanish from their sight, as I think fitting ; and the power of transforming myself into what appearance I will, is a prerogative Heaven has given me by my birth.

At these words the lady came down from her throne, approached the King, took him by the hand, and led him into a chamber, where there was a table covered with the choicest delicacies. She made him sit down, and placed herself between him and Muezin ; who, from all he saw, presaged no good to his master, and expected some unfortunate event.

As for the young King, he was charmed with the lady ; no reflections disturbed the pleasure he took in gazing upon her. He was officious to serve her ; but she said to him, do you two eat : for us the very smell of perfumes, or of meats, is sufficient nutriment.

When the Prince and his Vizier had done eating, two damsels presented to each of them a cup of agate, filled with wine of a purple colour. As fast as they drank, the damsels took care to replenish

their cups. There was wine likewise brought to the lady, but she drank not of it : she contented herself with smelling to it, which upon her had as great an effect as the liquor itself upon Ruzvanschad. They began to grow warm ; and the King spoke a thousand passionate things to the lady, who yielding to the inclinations of her heart, replied to him in the following terms :—

Prince, although you are a being of an inferior nature to mine, I have not been able to refrain from loving you. To the end you may be sensible of the value you should put upon the conquest which you have made, I would not have you be longer ignorant who I am. There lies in the sea an island called Cheheristan : this island is inhabited by Genii, and governed by a King, whose name is Men-outcher ; I am the only daughter of this Prince, and am called Cheheristany.

It is now three months since I left my father's court, and since, out of a curiosity to see the different countries inhabited by the sons of Adam, I take a pleasure in travelling : I have compassed the whole world, and I was now upon my return to Cheheristan, when, crossing over your realms, I happened this very day to see you hunting. I stopped to gaze upon you ; I found a sudden disorder within myself, and, while you were still in my sight, I was lost in thought. My breast heaved with sighs ; and finding, that, in spite of all my reason, I was become your captive, I blushed in secret. Is it possible, said I, that a man should cause all this disorder within me ? Shall a son of Adam triumph over my pride ? I was ashamed of my weakness, and would fain have withdrawn myself immediately from your presence ; but held as it were by the force of a charm I had not the power to do it. Then yielding to the tender emotions of my heart, which stayed my wandering footsteps, I now only studied the means to render myself pleasing in your sight. I took upon me the form of a white doe, and came full in your way, to draw you after me. You pursued me ; and after I had thrown myself into the fountain, you cannot imagine with what pleasure I saw you examine the water to find me out. I was transported to see you so restless, and I took it for a lucky presage. When I heard your discourse, I was ravished to find, that you were resolved to pass the night at the fountain. While you slept, I raised up this palace to receive you ; the genii that serve me, built it in an instant.

Cheheristany was going to proceed, when a damsel entered in great affliction ; the Princess, reading in her countenance the sorrowful news she brought, broke out into lamentable cries ; then she smote upon her face, and wept bitterly. What a moving spectacle must this be to the Emperor of China ! Pierced to the heart with the grief which she expressed, he was impatient to know the cause of it. And now he was about to demand it of her, when the damsel newly arrived came up to the Princess and said, O Queen, you know that the genii, although their term of years be longer than what is granted to men, are nevertheless subject, like them, to death. You have lost the King your father ; he has changed this perishable life for one that is eternal. The whole people demand you ; they expect you with impatience to rule over them. Hasten therefore to receive the homage of your new subjects, who are eager to render you the honours due to you. The Grand Vizier, my father, charged me to hasten your return.

Maimona, answers the Princess, it is enough. I will recompense the zeal of your father, and the duty which you have shewn. I shall go with you this instant. Adieu, Prince, adds she, turning to Ruz-vanschad ; then reaching out to him one of her fair hands, which he kissed with transport, I must leave you ; but be assured that a day will come, when we shall meet again ; if I then find you a faithful and a passionate lover, I will have no other lord but you.

This said, she disappeared. Immediately the light of the tapers that shone in the palace, was all lost in the thickest shades of night. The King of China and his Vizier remained in utter darkness, till the day light coming on, gave them a new surprise ; for, while they imagined themselves to be still in the palace, they saw nothing but a desert country all around, without the least appearance of a house.

Muezin, says the Prince, looking about him, are we to take all that has happened for a dream ? No, Sir, replies the Vizier ; I had rather believe it to be some enchantment. The lady we have seen is some foul sorceress, who, to inspire you with love, took upon her the resemblance of a beautiful nymph ; and all the fair damsels, that sung and played so exquisitely upon the lute, are so many demons devoted to her charms.

How probable soever the opinion of Muezin seemed, the King was too much enamoured to be persuaded by him. He was unwilling

to forfeit the favourable thoughts he had conceived of the lady ; and he returned to his palace full of resolutions to preserve always a lively and a tender remembrance of her. And indeed so far was he from forgetting her, notwithstanding he heard no more of her, and the Vizier daily strove to combat his passion, that he fell into a deep melancholy. He abandoned all his pleasures, and had no relish for any but that of hunting ; neither did he taste any delight to hunt, but in the place where his white doe appeared to him, and where he often flattered himself he might see her again.

In the mean time, it was now almost a year that he loved without any reason to hope that his love was not fixed upon a phantom, he began now to fear that what he had seen was no more than an enchantment. He resolved upon travelling, in hopes the variety of objects might serve to amuse him, and help him by degrees to wear out the impression from his mind. He left the government of his kingdom to Muezin ; and, notwithstanding all that his Minister could say to hinder him from the resolution he took of going unaccompanied, he set out by night quite alone. He was mounted upon a fine horse, with a saddle and bridle covered with gold, and enriched with rubies and emeralds : his habit was very magnificent ; and he girded upon his thigh a large scymeter in a scabbard studded with diamonds.

[The travels don't concern this letter so I pass on to events after the King's return home.]

One morning, when all the courtiers were assembled about the palace, and when, according to custom, they expected the appearance of their Prince, they were told, that no one knew what was become of him ; that the night before, when he had commanded all his officers to retire, he fell asleep upon a sofa, and that from that hour he was no more to be found, neither in his own apartment, nor in any part of the palace. Fresh enquiries were made after him, but all in vain. Several days being now past without a probability of coming at any notice of him, or so much as being able to guess where he might be : all his courtiers began to afflict themselves, as if they had been rivals in grief ; they dyed their faces yellow ; they gave themselves up to weeping, and strewed roses before the throne.

Muezin, amongst the rest, was not to be comforted : he loved his master passionately ; and in the height of his grief, Ah, my Prince, cried he, in what part of the world are you ? What shall I think of

your absence? Is it possible you should have undertaken another journey? Is it some enchantment that takes you from your people? Or do you abandon us of your own accord? No; you are too well persuaded of our zeal and our fidelity, ever to be willing to afflict us so deeply. There is no doubt but we are deprived of you by the pernicious arts of some enchantress.

While the Vizier and the rest of the courtiers gave themselves up to grief, the happy Ruzvanschad was completing his joys in the island of Cheheristan, whither he had been transported by the order of Cheheristany. The Princess, after she was proclaimed Queen, applied herself to affairs of state, and was wholly taken up for some days with the cares of grandeur; but in a little time, perceiving that she still loved the King of China, and that she had reason to be satisfied with his fidelity, she at last resolved to perform the promise she had made him. To this end she caused him to be carried off by a genie, who brought him into her own apartment. Ah, divine Princess, says Ruzvanschad, as soon as he saw the Queen of Cheheristan, is it granted me then to see you once more? Alas, I durst not flatter myself with so pleasing a hope! and I feared that you thought of me no more. No, Prince, replies Cheheristany; absence does not produce the same effect upon genii as upon men; it never shakes our constancy. It has not in the least impaired mine, answers the King of China; although I am but a man, I am in point of constancy equal to any genie. Ah, my Queen, pursues he with a sigh, what an age did the time of our separation appear to me! and with what impatience did my eyes long to behold you! Sir, says the Princess, I am satisfied with you; and since your love has borne the trial, I will this very day accomplish the promise I gave you; we will unite ourselves for ever.

The King of China made his acknowledgments to Cheheristany, and swore eternal love to her. After this, all the chief nobles of the realm and the people were assembled before the palace by the Queen's order, who spoke to this purpose to them:—Ye great and ye inferior genii, who hear me speak, as you are engaged by an oath to obey me, from the time that you invested me with the sovereign power after the death of Menoutcher, my father; I do hereby declare, that I will soon espouse the Prince Ruzvanschad; and I do, for that reason, order you to respect him as your master. When she had thus

spoke, she called him forward, and shewed him to the people. All the genii applauded the choice of the Queen ; and although the King of China was but a man, they made no scruple, so great was their love to their Princess, to crown him King of Cheheristan.

The ceremony of the coronation being over, preparations were now making for the marriage ; but before it was performed, Cheheristany said to Ruzvanschad, Sir, I must have you promise me one thing. I do not require this promise of you but for our common welfare ; but it is absolutely necessary that you should make me such a promise, and that you should punctually keep it ; for if by inadvertency you fail in it, we shall both of us be wretched. Well, Madam, I pray you, interrupts the King of China, keep me no longer in suspense ; let me know what it is I am to promise ; you need only speak, I am ready to perform what you require. What I expect from you, replies the Queen, will be a severe trial, and I fear too great for you. As I am a genie and you the son of Adam, we have different inclinations : we act in a different manner from men ; we have our laws and our customs peculiar to ourselves. In a word, it is impossible that we should live long together, except you blindly comply with me in all things.

Alas, Madam, says Ruzvanschad, and is this that severe trial which you suspect me to be incapable of? Have a better opinion of us men, or rather of yourself ; believe that you will always have an absolute rule over me, and that I shall never have any will but yours. Well then, replies the Princess, you give me your promise, if I happen to do anything in your sight, which displeases you, that you will be very careful not to blame, nor to reprove me for it. Yes, my Queen, said he, so far will I be from blaming your actions, that I swear to approve them all. I will, throughout my life maintain a complaisance for you equal to my love ; and you will disoblige me for ever, if you doubt of me. It is enough, replies Cheheristany ; I will trust to the faith of your oath ; and whatsoever I may do before you, I hope you will keep your thoughts to yourself ; as to anything more, fear not that I will demand an unreasonable compliance from you. The genii never do any thing that is improper. If, therefore, at any time you see me do things that to you seem unreasonable, say within yourself, she has her reasons for acting thus. The King of China having renewed his promise, that he never would object to any thing

which the Princess might do, nothing was now thought of but their marriage.

The Queen caused Ruzvanschad to ascend a throne of gold, and then seated herself by him. All the nobles ranged themselves before them, and all the women of the Princess ranked themselves on either side of the throne. The nobles paid their duty and homage to the King, and performed some ceremonies peculiar to beings of their kind. In the next place, the people celebrated their nuptials by festivals and rejoicings for three days. The King of China, infinitely pleased with his good fortune, made it his whole study to please the Princess; and consecrating all his hours to pastimes and pleasures, he for a while lost even the remembrance of China.

When they now had been a year married, Cheheristany was brought to bed of a Prince as bright as the sun. All the genii made fresh rejoicings; and the King, transported to have a son by so charming a Princess, returned his thanks to Heaven perpetually for the blessing. He was out upon hunting when the news was brought to him. He returned back to the palace in all speed to see the child, which at that time the mother held in her arms near a great fire. Ruzvanschad took the little Prince, and after having kissed him very gently, for fear of hurting him, he returned him to the Queen, and she immediately cast him into the fire; when on the instant, Oh miraculous surprise! the fire and the new-born infant disappeared.

This wonderful accident troubled the king not a little; but how great soever his grief might be for the loss of his son, he bore in mind the promise he had given to the Queen. He indulged his sorrows in silence, and retired into his closet, where he wept, saying, Am I not very wretched? Heaven grants me a son; I see him thrown into the flames by his own mother; and I am forbid to blame a deed so cruel, Oh mother devoid of nature! O cruel—but no more, adds he, correcting himself: I may offend the Queen, if I signify my grief to her. Let me restrain my sorrows; and, instead of setting my heart against a deed so seemingly full of horror, let me say, and let me prevail upon myself to think, that the Princess does not act without reason.

The King therefore said not a word to Cheheristany, notwithstanding the strong tendency of his heart to reproach her with the death of his son. In a year more she brought a Princess into the world, whose beauty surpassed even that of the little Prince. She

was named Balkis. All the genii of the isle did likewise celebrate her with festivals during three days. The King was ravished with the beauty of his daughter: he was never tired with looking upon her. She made him forget the Prince of Cheheristan; but the joy of this unhappy father was of no long duration. Not many days after the Queen was brought to-bed, there was seen come into the palace a great white bitch, with her mouth wide open. Cheheristany perceiving it, called her, and said, Here, take this little girl and the cradle. Immediately the bitch ran up to the cradle, took it in her mouth, and went away with it.

It would be difficult to express how greatly the King was troubled at what had happened. Notwithstanding the complaisance he had sworn to maintain towards the Queen, he was now near breaking out into a thousand harsh and disobliging terms: he had no other way to avoid it, but by retiring. He shut himself up in his closet, where, calling to mind the sad fate of his son, and struck with the cruelty he had newly seen—Ah, inhuman Cheheristany! said he, is it thus you treat your own children? If the genii delight in doing actions so contrary to nature, let them cease to boast of the advantages of their kind. I abhor their customs and their laws: those of men are far more reasonable. But, said the Queen to me, the genii never do any thing that is improper; and if at any time I do what may shock you, say within yourself, she does not act thus without reason. Is not what she has done unreasonable then? Ah, now I comprehend the mystery, and see the cause of my misfortune! The laws of the genii, without doubt, determine, that when they marry with men, the children by such a marriage should be put to death: this, to be sure, is the motive of her extraordinary procedure. O cruel Princess! think you then that I can be devoted thus to your will? No, notwithstanding all the tenderness I have for you, it is not possible that I should bear with your barbarous customs.

Although Ruzvanschad was sorely afflicted with the loss of his children, he over-ruled his grief so far as not to reproach the Queen. But the island of Cheheristan now became an uncomfortable place to him, and he resolved to return to China. Madam, says he, one day to Cheheristany, I have a desire to revisit the realms of China: permit me to go back to my people, who have now a long time offered up vows for my return. It is well, replies Cheheristany; I

consent that you satisfy the desires of your people ; and moreover, your presence is necessary in your dominions. I know that the Moguls are now levying a powerful army against you ;—begone to defend your Empire. Though the bravery of your subjects be great, they will fight better when led on by you : I will not fail to make you a visit myself. This said, she called a genie, saying to him, Bear the King instantly back to China. The genie obeyed immediately, and Ruzvanschad had soon found himself in his own palace again.

When Muezin saw him, he rejoiced exceedingly : he prostrated himself before him with his face to the earth, and said to him, Ah, my Lord ! Heaven at last has heard my vows, and you are restored to your people. During your absence, I have governed your dominions ; your subjects, despairing of your return, conferred the empire upon me ; but I now once more behold my Lord and my master. Remount your throne, Sir, which your slave has filled too long. The King related to his Vizier all that happened to him, and this Minister was highly astonished.

In the meantime, The Moguls marched towards China with great powers ; and now they entered within the kingdom, and promised to themselves no less than an entire conquest. When news was brought to Ruzvanschad of their march, he assembled what troops he could, and went to meet the enemy : he found them posted on a vast plain, where they wanted for nothing. He encamped at a convenient distance from them ; and soon there was seen arrive a great abundance of provisions of all sorts—particularly quantities of biscuits, fruits, and conserves, with an infinite number of skins filled with wine and other liquors : these provisions were loaded upon mules and camels, and a Vizier, belonging to Ruzvanschad, conducted them to the camp. This Minister's name was Wely. As he came upon the plain with the provisions, the Princess Cheheristany appeared before him, accompanied by several genii, who unloaded the camels, bruised all the biscuits, overturned the fruits and the conserves, and pierced the skins ; in a word, they made havock of every thing, and let out all the liquors, so that they left nothing in a condition to be eat or drank.

Wely was very much astonished to see the provisions thus wasted ; when the Princess said to him, Go tell the King that it is the Queen, his wife, who has committed all this disorder. Upon this he speeded

away with his message to the pavilion of Ruzvanschad. Sir, says he to him, your army is left without provisions. Then he told him all that had been done. The King was highly offended ; even the death of his children, he thought, was more excuseable than this action. While he was yet warm with indignation, he saw the Princess appear —Madam, says he to her, I can no longer keep silence ; you have tempted my patience too far. You have thrown my son into the fire, you have given my daughter to a dog, and, how great soever my displeasure may have been, I have withheld it from you. I have smothered my griefs ; but since what you have now done is a manifest attempt upon my life and my glory, I can hold no longer, and I must reproach you. O most ungrateful ! is it thus you repay my tenderness ? What is it you purpose ? See here my army, deprived of provisions, what will become of it ? say—and what will become of me ? No doubt you intend that, without fighting, I should fall into the power of my enemies. Is this to be supported ?

Sir, replies the Queen, it had been much better you had now again stifled your thoughts than to suffer them to break out so unreasonably ; but since you have spoke, and that the evil is past remedy, bear it as you can ; it were in vain to seek out means to prevent the hard fate which I dread, since it is already fixed. Ah, weak and imprudent Prince ! why have you not been able to restrain your tongue ? Little do you think what that fire was to which I delivered your son : it was a wise and knowing salamander, to whom I entrusted the education of the young Prince ; and the bitch you saw is a fairy, who was willing to take upon her the care of your daughter, to instruct her in every kind of knowledge suitable to a Genie Princess. The salamander and the fairy answer my expectations, and they breed up the Prince and his sister in an extraordinary manner : you yourself shall be a witness of it this instant. Here, my guards ! continues she, speaking to the genii that attended her, see that my son and daughter be this moment brought hither. Scarce had she spoke these words, when the Prince of Cheheristan and his sister Balkis came into the tent of Ruzvanschad ; but none of the men that were then present saw them, excepting the King.

Notwithstanding the situation of mind the King of China was in to find his provisions wasted, he was transported with joy when he saw his children : he embraced them both, one after the other, with

such emotions of tenderness as parents only feel. While he was thus busied, Cheheristany went on with her discourse. Sir, says she, I must now inform you why I overturned your provisions. The King of the Moguls means to put out your lamp of life, and to reduce under his dominion the empire of China. To compass his designs more effectually, he has, with a considerable sum, corrupted the fidelity of Wely: this perfidious Minister has undertaken, for the reward of an hundred thousand sequins of gold, to destroy you and your whole army by poison. You having intrusted to him the care of supplying the army with provisions, he has caused the biscuits and the wine to be tainted with a poison that instantly works its effect. By this contrivance your Generals and your Captains would all have perished, had I not wasted the provisions. You, perhaps, will not be apt to believe what I say; but you may easily convince yourself. Order the Vizier to be called; let him eat a morsel of the biscuits in your presence, and you will see the consequence of it.

The King was troubled at these words: he ordered Wely to be called; and when this Minister came, Go some one, said the Prince, and find me out some pieces of the scattered provisions. There was brought to him a box of sweetmeats, which was yet entire, and closed with the signet of the Vizier. The King commanded the box to be broke open, and bid the traitor eat of the sweetmeats. Sir, says Wely, at present I have no appetite; but when I have, I will eat of them. If you do not eat of them this instant, replies the Prince, I shall strike off your head. Then the Vizier, seeing that his death was inevitable, chose rather to obey. He took of the sweetmeats; and no sooner had he tasted of them, but he fell down dead in the presence of all that were in the tent.

Sir, says the Queen to Ruzvanschad, you can no longer question the treachery of your Vizier, and doubtless you rest now persuaded that the genii do nothing without reason. Yes, Madam, replies the King, I own myself to blame in not religiously observing the injunction you laid upon me. But my fears are not yet over; my army remains without provisions, and they will perish by famine who have escaped the poison. No, no, says the Princess, our army shall not want; they will be abundantly supplied to-morrow; for this very night you shall attack your enemies—you shall cut them in pieces; you shall become master of their provisions, and shall return

into your capital a conqueror in triumph.

As the Queen said, so it came to pass. In the dead of night this Princess, with her whole guard of genii, put herself at the head of the Chinese, and poured in upon the Moguls with the whole army. After a short resistance, they were totally defeated. The genii and the Chinese made so great a slaughter, that it was with difficulty the King of the Moguls, who commanded in person, was able to escape. In the morning, when day appeared, the whole plain was seen strewed with dead bodies ; and Ruzvanschad was the better pleased with this victory, in that he lost but few of his men. His army obtained a rich booty ; all the equipages of the Moguls, as well as their provisions, which were in great abundance, became a prey to the victors.

Then Cheheristany said to the King her husband, See where your enemies all lie in the dust. The war is ended ; you may return the way you came, and live in your palace undisturbed. As for me, I am obliged to leave you : there is a necessity we should be separated for ever ; you never more will see me, and I shall be deprived of the sight of you. It is your own fault, my dearest Prince ; why would you not keep the promise you had given me ? Ah, just Heaven ! cries the Prince, what is it I hear ? In the name of Heaven, Madam, think no more of your fatal purpose : I repent that ever I failed in my word to you. Vouchsafe to pardon me ; I protest to you solemnly, that henceforward you never shall have cause to blame me. Do what you will, and be assured that I will be very careful to disapprove of nothing. Your protestations are superfluous, says the Princess ; our laws compel me to estrange myself from you : the laws of the genii are not to be infringed. Cease your endeavours to stay me ;—alas ! were it in my power to pardon you, I should not be inexorable. Adieu, Prince ; farewell for ever, adds she, weeping as she spoke ; you lose at once your children and your wife. In vain you will wish to behold them more : never more will they delight your eyes. At these words she vanished from his sight, with the Prince of Cheheristan and the Princess Balkis.

How great must the grief of the King of China prove, deprived of objects so dear to him ! it is not in the power of words to express it. Had he lost the battle, and fallen into the hands of the Moguls, he would not have been so greatly afflicted. He disfigured his face, threw earth upon his head, and expressed all the actions of a frantic

person. He took the road to his capital with his army ; and as soon as he entered his palace, he said to Muezin, Vizier, I leave the care of my affairs to you ; govern my empire ; act as you think proper ; for my part, I am determined to pass the rest of my days in weeping after my wife and my children, whom I have lost by my own imprudence. I will see nobody but you ; neither do I give you the liberty to talk to me, but upon condition that you will never trouble me with any thing that relates to my kingdom : you shall speak of nothing to me but of Cheheristany and of my children. To indulge my sorrows shall be the only business of my life.

Ruzvanschad accordingly shut himself up in his apartment, where no one but Muezin had permission to enter. This Minister visited him every day ; he took care to please the Prince by indulging him in his grief, and hoped that time might wear it away ; but, on the contrary, it grew upon him daily. The King fell into a deep melancholy, and remained almost ten years in a languishing condition. At last, not able to bear up longer under his sorrows, he fell sick ; and he was now near dying, when the Queen, appearing full before him in his apartment, addressed to him the following speech :— Prince, I come to put an end to your trouble, and to restore you to life, which you are upon the point of losing. Our laws required that, to punish your perjury, I should continue ten years in a state of separation from you ; neither was I by them at liberty to return to you again, unless you had persevered in your fidelity to me during that term of years. For this reason it was, when I quitted you, that I had no hopes ever to see you again. The sons of Adam, thought I, are not capable of so lasting a constancy : I shall soon be banished from his remembrance ; I thank Heaven I have been deceived ; and I now see that men can love with constancy. Therefore, Prince, am I returned to you, continues she ; and to complete your joys, you shall likewise see your children again.

No sooner had she spoke, than the Prince of Cheheristan and the Princess Balkis entered, and presented themselves before Ruzvanschad, who was ravished at the sight of them. As he was the fondest father, and the most loving husband, his heart was divided by all the tender passions, which paternal and conjugal affections could inspire. His health was renewed in a little time : and these four persons lived happily together a great many years. At last, after the death of the

King and of the Queen, the Prince of Cheheristan took possession of the kingdom of China ; and the Princess Balkis went to reign in the island of Cheheristan, till in time she became the wife of the great prophet Salomon.

LETTER LV.

THE BEE AND THE BOX.

2 MAY, 1895.

T is a curious coincidence, but by no means unique in the course and history of these letters, that while finally looking through the Persian Tale yesterday morning, before handing it to the printer for incorporation in your book as an illustrative episode, a real incident occurred which actually furnishes even another illustrative episode in this brief letter. While reading and writing in the quiet of my room, at my Cheshire home, I was suddenly disturbed by an unusually loud buzzing outside the door, and hastened to see what was the matter. The door opens upon a landing, and a few inches from it on the right, at right-angle, is the landing window ; and at that window, inside, *trying to break it*, was the largest bumble-bee that I have ever seen—quite a giant of a bee—in a terrible state of excitement, and making the loudest buzz that I have ever heard, barring that of a steam-buzzer. It proved in the end to be, indeed, another, and an amusing, illustrative episode ; and another remarkable and instructive case of window-pane enchantment. And the window was closed, and would not yield to my attempt to open it so as to break the enchantment. The intruder had evidently come up through some open window or door below, and had worked himself into this dreadful passion on finding his way stopped by this never-before-experienced congealment of the daylight. But he had no right whatever to be there at all making that disturbance in my house. His was altogether the wrong livery for that. Had it been a blue-bottle it would have been right enough. She has a special license to enter any doorway, or open window, or opening anywhere, and search for dead-flesh couches on which to

distribute her cargo of eggs, by means of instinctive attraction and affinity ; whatever the cook may think or say. Her maternal ancestors all held the same license long before cooks had any occupation, or were invented or created. And her children inherit the like right to enter our houses and visit our sugar basins. But it was not at all the right thing for this giant bumble-bee to enter my house, and especially to endeavour, with such fierce determination, to break my window-panes. His only license is to seek and take the honey provided for him in the out-o'-door summer flowers, and not to meddle with our sugar basins as the house-fly is privileged to do. However—as you know very well beforehand—in spite of these misdoings, I was disposed to be very forgiving and merciful to him ; and even to help him gently out of his wrong way with its consequent enchantment of the sunlight. Otherwise his false step, or false steerage, would bring its own lingering punishment, and would probably prove fatal to him ; with his want of knowledge of window-panes, and his determination not to believe in them, but to force his way through their enchanted light by his utmost effort of force ; accompanied with his utmost effort of vain swearing.

It is curious how very catching is that state of mind and body known as being “in a hurry.” I have before referred to it as being remarkably catching with little dogs the moment they see anybody running past in that state of mind and body. This giant bumble-bee was in such a terrible hurry to do what he meant to do, and break my windows, that I caught the heat from him, and hurried to do what *I* meant to do in the crisis, and to fetch a box. I ought to tell you in connection with my reference to his “livery” that this violent noisy fellow was dressed in a truly magnificent uniform of rich black and orange plush of the very finest quality. Now notwithstanding his unwarranted intrusion, and excessive rudeness, impudence, and bluster on my landing, I had a mind to treat him in return with the utmost gentleness and consideration, and instantly planned his restoration to freedom “in a hurry” even without rumpling his splendid plush, or disarranging any of his finery, or injuring his beautiful very active limbs—very active with extreme passion—or anything that was his. Although he had no business there making that great disturbance at my room door. A very few feet from the said tightly-closed window was an open one in my room—that one which I have spoken of as

looking out towards Siberia and letting in the influenza, as well as my entomological night visitors—and I hurried to fetch from my writing-table a thin wooden box not quite five inches in diameter, with a hinged lid, in which to catch him while butting and buzzing at the enchanted window, and pass him out at the open one, without hurting him, or disarranging his finery. Meantime the furious thing seemed to have gone raving mad about the unseen obstruction, and rammed it, and swore horribly that he would break through it—break my window !

I had him in my box four or five times in as many seconds—and what a buzz he made!—and each time, before I could close the lid, he bounced out again and dashed at the enemy.

I spoke just now of my studious kindness to him, that I might contrast his spitefulness, blindness, and ingratitude. For I now know very well, from his behaviour to the end, that if he had seen me he would have risked his life to sting me savagely; in return for my thus scheming his salvation; and you will believe it presently. But, big as he was himself, I am so much bigger that I am too big to be seen by him; with all his thousands of eyes. It was just so, you will remember, in that Southport tragedy of the Spider and the Fly. As with that fly, so with this bumble-bee, he had no idea that I was standing near him, and, in his case, operating only for his good; but, if he had known I was near he would have stung me savagely. However, I forgave him and persevered; and he persevered without forgiving anything.

Thus far he did not only not see me, but was so blind in his rage that he saw nothing, as Pat would say, but the obstruction before him which he could not see; and thus he seemed not to notice the pursuing box dodging him in the rear. But after a few seconds of most energetic action, after having, as it were unconsciously, flung the box from him time after time by dashing forward from it, it suddenly arrested his attention by its persistence. And then, still not perceiving the vulnerable hand which guided it, the enraged creature turned his attention and energies to it with the utmost fury; attacking it on the upper edge, so that I could not shut him in without the danger of hurting him. It would have astonished you to have witnessed the violent savagery of this attack, from both extremities of the infuriated bumble-bee—both at once, sting and

mouth—accompanied with such a buzzing as could certainly be nothing but bumble-bee-swear, by whatever means produced. It was as different to the ordinary buzz among the flowers as the music of a mild hymn to the tempest of a fierce dog-fight. I am sure it was swear. Speaking of his mouth, is it not truly wonderful how so much furious savage energy can be obtained from eating honey?—besides its growth of that magnificent plush livery! Then, again speaking of his mouth; while stabbing the box furiously and incessantly with his sting—firmly believing that he was murdering it, although he found it so tough—he certainly demonstrated as eagerly with his mouth at the same time, as if he were at once devouring the thing he was murdering with his sting. But I do not see how he can be very formidable at that end. I should not have thought that his whole bunch of mouth-implements—mandibles, labrum, labium, maxillæ and palpi—would have been of much use to him in battle, savage as the demonstration seemed; like that of a ferocious dog pretending to gobble up a prostrate foe. Perhaps it was a mere demonstration of savage will rather than of potency. But I don't know. As to the other extremity there can be no doubt that very real execution was intended and attempted; with its rapid dig, dig, dig of punishment. Thus did he misunderstand and misuse that innocent instrument of tenderness and salvation, which had lurked in his rear only to render him the service of complete and instant deliverance from dangers into which he had foolishly wandered without a call or a license—to deliver him even without a bruise to himself or the mere rumpling of his plush uniform.

Then, when he thought he had conquered that box, and deprived it of all power to take him and box him, and, so, thoroughly secured himself from its manœuvring attacks in the rear, he made another savage dash with his utmost momentum at what had been to him, as he thought, the impedimentum of enchanted daylight—meaning to break a pane. He had no notion that during his battle with the box I had transferred him and the battle-scene from the closed to the open window, and when he dashed right through, behold, he found himself at liberty in the open sunny air; a great conqueror as he supposed; for he counted this deliverance as another victory of his own. It is all a mistake to call these fellows *humble-bees*.

Thus this blusterous bumble-bee claimed the entire credit for two

glorious achievements—one in subduing the monstrous box nearly five inches in diameter which had been dodging in his rear to take him and box him; the other in breaking through the formidable obstruction of the enchanted daylight—and he claimed them as victories due entirely to his own prowess and strength guided entirely by his own wisdom. And thus this episode is suggestive; and all the more interesting in recording a fact and not a parable.

LETTER LVI.

MORE OBSERVATIONS ON THE DANCING BEAN.—DIOMEDE AND GLAUCUS.—SPRING, ELECTRICITY, AND CARBONIC ACID GAS.—THE NERVES.—THE EAST WIND.—LEAVES.—“PRIMITIVE MAN AND HIS WORK.”—CONCLUSION.

13 MAY, 1895.



HE printer's progress affords me the opportunity to write you just one more letter which will indeed be the final one of this series. So I will now add to my report on the Dancing Beans up to date. Since closing the letter of 21 March last I have continued to watch them daily, and especially every night under the influence of the light of my lamp. W. has continued to take the lead in activity, and M. has become more and more sluggish, but on this thirteenth of May they are both still living and moving. It has been a cause of wonder to me that these semi-tropical Mexican creatures should have thus lived through our late exceptionally Arctic winter. But they have not only survived the cold, but have lived in imprisoned *activity* about ten months without a particle of solid food or liquid water.

I have followed the advice of Mr. Wells of Chicago and exposed the dancers to the sunshine for a short period each day when accessible, and I presume that one of the mechanical effects has been to expand the used air inside the bean-shells, and force a portion of it out through the pores. And the subsequent reduction of temperature would increase the pressure, and replace the expelled with fresh air including aqueous vapour. About a month ago it occurred to me that as the life of these dancers must be regulated very much by the

atmospheric changes, it might be advantageous to them to have the full benefit of the pressure, which is greater on the ground than above it. So, whenever weather permitted, I have daily placed them on the ground in the garden in their box, covered with a piece of glass for their protection from birds, and I have found it to result, apparently, in increased activity at night, under the influence of the light of my lamp. As sensic light causes the assimilation of solid carbon from its gas in the feeding of plants, which assimilation ceases during the darkness of night, so it appears probable that the daylight, or its influence, may so penetrate the bean-shell and cause the assimilation by the dancer within of the gases necessary for its food.

The immensity of the variety of forms and conditions of all life known to us, both vegetable and animal, has often occupied your thought. With increasing knowledge the diversity appears—like everything else which we study and attempt to grasp—infinite. If there could be any definite extremes in the conditions of animal life, it would seem that our friend the fly would be at one end, and this animated bean at the other. I have thought so when watching these extremes meet so often during last autumn. While the solitary prisoner has been jerking his cell about within such narrow limits, the free ubiquitous fly has alighted to have a look at the show in his inquisitive way, without invitation and without payment. And there has stood the free, flying, running, constant eater and drinker of all foods ; the pay-for-nothing socialistic anarchist ; the very symbol of saucy independent freedom of going everywhere and helping himself to everything, and with the speed of flight of the fiercest hurricane—there he has stood rubbing his hands and his elbows watching the jerking windowless prison of a fellow-creature, whose only action and function in life appears to be to jerk that prison about in solitary darkness, and without even a particle of solid food or liquid drink—even the prison-fare of bread and water.

And thus far no external change has taken place with these beans. No hole has been bored in the cases, and no attempt has been made to bury them in the loose dry soil on which they have been placed in the box. Although I have made nightly notes of their separate movements and relative activity there appears to be nothing to add to my already recorded observations. So let us now pass from the subject of the inhabitants of these bean-cases, which I believe to

have naturally nothing to do with leaves or leaf-rolling, to the actual subject of leaves, in reply to a question which you have put to me. But I must start with a preface.

A few days ago I happened to be reading those passages in Homer's sixth "Iliad" which record the meeting, on the Trojan battle-field, of Diomede and Glaucus, and their preparation for mortal combat; during which Diomede, eying the foe, is struck with his godlike appearance, and enquires if he is an immortal god; or, if not, of what mortal ancestry. Glaucus, confessing himself a mere man, says:

"Magnanimous son of Tydeus, why dost thou enquire of my race? As is the race of leaves, even such is the race of men. Some leaves the wind sheds upon the ground, but the fructifying wood produces others, and these grow up in the season of spring. Such is the generation of men."

That passage set me pondering on the rotations of the seasons, and especially on the Divine Providence evident in the bursting forth of the vigorous spring. It is curious that on that same day you were writing to me on the subject of spring and its leafage, and asked if you had been correctly informed by a philosopher that in the spring we are personally somewhat minus electricity, and suffer depression accordingly, because Nature needs more of her electricity at that season for her other purposes of extra germination and abundant life, both animal and vegetable. The day following that of this coincidental thought I received your letter and asked permission to answer it in this final review-letter.

We have already had occasion to dwell upon the state of mind of those people of a sceptical and ever-grumbling habit, who point to the waste, as they consider it, ever going on in Nature, and charge her with being careless of her products, and represent her as peevishly crying: "a thousand types are gone: I care for nothing, all shall go." They include in their censure of Nature's waste, as they will have it, not only the loss of her ancient obsolete types of life, the forms of which we discover hidden away moulded in the rocks, but her annual autumn and winter waste of her spring and summer leaves and flowers, as well as those seasons' abundant sentient insect and other life. Glaucus in his simile seems to regard man, equally with the autumnal leaves, as Nature's waste, and of little more account. But our poet, in thus charging Nature, qualifies his censure at the finish with the

suggestive words of wisdom "Behind the veil, behind the veil." We have fully discussed all this in some of the foregoing letters ; and need not further dwell upon the short-sighted presumption of the sceptic grumblers here. The "veil" is our natural blindness in this matter, which renders us altogether incompetent to judge ; and therein lies the unwise presumption of the censurer of Nature.

As to the extra electricity of life the operations of which we witness in the spring in the growing grass and herbs and budding flowers of the earth, and in the leaves of its trees, I fail to see how that can be at the expense and to the detriment of the human electric vitality. Electricity is probably a condition of light and heat, sun-derived—certainly sun-derived—its proportion or activity being regulated by the amount of light and heat received from the sun. So the light-heat-electricity increases as the sun now seems to draw nearer to us day by day, with increasing day ; and the spring-life is on the increase solely because of the daily increase of solar electricity. And this increase of robust activity of life, in proportion to the increase of solar electricity from the still lengthening day, we shall continue to witness until all Nature is in full glow, both vegetable and animal. You will perceive at a glance that all this extra electricity of life is supplied direct from the sun, and none of it from us. And we share the extra supply instead of parting with any of our own stock, of which, indeed, we have only the constantly passing current from the sun. It is not as though the new life of spring burst forth first, and then had to utilize the electricity as a sort of food, by, secondly, attracting and absorbing it. The spring life is itself the consequence of the extra spring electricity, which extra we, the already-matured, also share.

But as the spring really is a period of depression to some extra-sensitive constitutions, there must be a cause for it, which is worth searching into. I have always regarded spring as especially the season of vigorous vitality, and ascribed it to two causes ; one being the extra and daily-increasing emission of electricity from the sun, acting upon arousing life—aroused by it—after the repose of dormant winter ; and the other the extra and daily-increasing emission of vital oxygen gas from the growing grass and leaves and all the other green of spring—caused also by the extra electric warmth. These are certainly the two vitalizers of the animal world ; ozone itself being, as you

know, merely oxygen gas in a state of condensation of volume. The great devitalizer, on the other hand, is carbonic oxide, or carbonic acid gas, or carbon vapour of any sort, with its great affinity for and tenacity of the vital oxygen, when this carbon vapour is present in the air in abnormal quantity. Yet, curiously enough, carbonic acid gas is probably more abundant on the earth in the winter than at any other time, and does not then depress or poison us. This gas as you are aware is the chief result of the decay of vegetation, and especially of the autumnal leaves, in which operation of decay the vegetation, in becoming carbonic acid gas, takes back from the air the amount of oxygen which it liberated into it in the spring, when it retained the carbon to form its chlorophyll, and it must therefore be most abundant in the dormant winter. And besides this supply from the decay of the spring and summer growth of trees, which is not re-utilized during the dormant season, there is an extra production of the devitalizing gas in all human settlements from winter's extra fires. And of course all breathing animals also add to the supply. Yet so complete and wonderful is God's Art of Government—so miraculous in the sense of so wonderful—that life is not poisoned nor even depressed by the extra winter store of this devitalizer. I have before referred to the extreme elasticity of carbonic acid gas and its sensitiveness to changes of temperature. It is that creative provision which saves us from being poisoned by it in the winter. The cold condenses it immensely ; and its specific gravity is, of course, increased in the same proportion ; and it becomes so heavy as to sink into the hollow places of the earth, and into the porous earth itself, and into the waters ; and the deeper your well the more will your spring-water sparkle with this gas ; and in the water it is wholesome to drink, although in the air it is poisonous to breath.

But as the sun in a manner returns to us in the spring, with his rays less slanting from the perpendicular, and therefore with daily increasing supply of sensific heat and of electricity, this sensitive gas is gradually expanded upward more and more to the developing leaf-buds, where it is needed.

Meantime the grass and all the green herbage of the surface of the ground has been, and is, hard at work changing the deleterious carbon of the acid gas to green chlorophyll, and liberating the two-thirds of vital oxygen—considerably more even than two-thirds by weight—and

this vitalizing process continues and increases day by day. It is true that at the same time that the daily increasing electricity brings with it increasing life and vigour, it also operates upon whatever dead organic matter may have remained from last year in a suboxidized state, or unconverted into carbonic acid gas, and completes the process at the expense of the free oxygen. But this electric decomposition, and the recombination by the same electricity in the chlorophyll-forming process, in which the same oxygen is again set free, may be said to occur in current instantaneousness; for the young plants instantly seize the newly formed carbonic acid gas, restoring the oxygen, and assimilating the carbon. Or, in other words, to use repetition for the sake of emphasis: At the same time that the extra sensific spring heat, and the extra spring electricity, daily received from the sun, are doing this work of decomposition, and replacing oxygen with carbonic acid gas, at the same current and re-current instant they promote vigorous hungry appetite in the vegetation to feed upon the carbonic acid, and consume it at a rate equal to its generation. And every spring leaf and green stalk and stem not only feeds voraciously upon this upwardly expanded winter store of gas, and its additional spring supply just referred to, but in changing the carbon of it into chlorophyll, it restores to the air the other two-thirds of pure oxygen, which had rendered the carbon acidulous and gaseous. It is true that while all green vegetation during spring and summer breathes out oxygen during the day, it breathes the undecomposed carbonic acid gas during the night in the darkness; but the quantity is too small to count for harm. It is not the result of a leaf-process of respiration, but is the mere expiration of gas which was probably drawn up by the plant through the root with its moisture, which cannot be decomposed without daylight, and oozes out with the perspiration of the plant. It is too small to count for harm, and as the spring advances and the nights shorten, even that small quantity becomes less and less during the 24 hours.

I trust I have shewn that from the first green-leaf-budding of spring, every succeeding day, the atmosphere and waters become more electric, and more oxygenized, and less carbonized, and, consequently more and more vitalized. It seems to me that the fine chemical and mechanical operations of Nature in the spring are so divinely contrived, and so operate, as to out-balance what might have

appeared to be possible sources of depression ; and that they never fail to bring about the great vernal song and cry of joy and health and vigour and hope which is already being chanted around me while I write this letter. But I cannot, of course, say that this is without exception the rule of spring. I don't know positively. It does not, of course, follow that there cannot be exceptions because I have not sufficient science to discover a cause for them. It is curious that I can go on writing this letter in the midst of this great vernal song and cry of joy and health and vigour and hope which is being chanted around me, and find no interruption in it, until a new performer puts in "Cuckoo ! cuckoo !" with which I have been frequently interrupted to-day, and had to stop and listen until he had finished.

I think the spring depression referred to in your letter must be exceptional and not the rule, and that it may be purely nervous. In some conditions the nerves might be affected by a change of temperature from colder to warmer, if that change in spring could possibly reach the nerves to affect them. The increased heat might possibly expand the nervous juice from its normal place in the nerve into the pores or cavities supposed to be the channels of the animal spirits, and so cause disorder or depression. But I cannot offer this supposition as having any weight or authority whatever.

Or it might be that the east winds of spring have something to do with the question. We know that they are nasty, and disagreeably affect some constitutions. I am not quite clear on the subject of the east wind. To look on the map it would seem plausible to theorize that our east and west winds are easily accounted for by our geographical position in regard to land and ocean. To the east, beyond the very limited German Ocean, there is a vast extent of land whose breezes are far less salubrious, being Siberian, than those from the ocean on the north and west, or the balmy fruitful lands of the south. But some years ago I was talking on this subject with a friend who had been a great traveller, and whose name had been given to some recently discovered land in the north ; and he is a man of great learning and science. He told me that the east wind was nasty everywhere, even when blowing off the Atlantic on to the eastern coasts of America. And he accounted for its chilliness and force by the opposition of its course to the rotation of the earth on its axis from west to east, whereby its own force from east to west over the surface

of the earth was accelerated. This does not seem to me quite a full and satisfactory explanation of the nasty nature of the east wind ; but I am no authority whatever on the subject in the presence of the opinion of my learned and much-travelled friend, and can offer no theory better than his. In any case it may be the east winds which produce the depressive effects of the spring upon some constitutions.

Let us return for a few moments once more to the subject of "leaves" and the words which Homer ascribes to Glaucus : "Some leaves the wind sheds upon the ground, but the fructifying wood produces others, and these grow up in the season of spring. Such is the generation of men." This is a remarkably correct comparison. The decay and renewal of all physical organisms is the law in Creation, and it is therefore Divinely Wise, and is no waste. The apparent death means always new life and renewed youth and beauty with ever increasing individualities. The learned author of "A Manual of Botany" and many botanical papers—Mr. Robert Brown, F.L.S.—writes what would pass for a commentary on these words of Glaucus, concluding thus :

"Finally, it is not carrying the analogy of plant and animal too far if we also claim for the leaves the functions of hearts. They are lungs, because they are the breathing-organs of the plant. They serve as skin, because through them the plant perspires. They are stomachs, because within their 'cells' the nutritive fluid gets fitted for building up the plant. But this nutritive fluid is also, after it leaves the leaf-stomach, the blood of the vegetable. Hence the leaf is a heart which despatches it on its body-building errand, and of course, if this simile is admitted, then the leaf-stalk is the representation of the aorta or great artery through which the blood from the heart of the higher animals is sent through the body. The leaf-stalk also bears out the analogy ; for just as the aorta in very old people becomes bony, and can no longer perform its all-important functions, so in like manner the leaf-stalk in leaves which have finished their course becomes clogged with mineral matter."

Thus in both the vegetable and the animal worlds this clogging appears to be Nature's final mode of insisting upon that universal periodical change which we call Death, that new generations may in turn succeed, and run their appointed courses, from leaves to men, and from men to leaves.

In Letter XLVII—18 September, 1892—I seemed to say Farewell to you in connection with this Review, and immediately started the fresh sequential series entitled "Primitive Man and his Work," which had reached the commencement of its own Letter XLIX when I paused in that work to fulfil your desire that I should guide this Review series through the press. During the printing I have found occasion to add supplemental letters until we have at length reached this final fifty-sixth letter of your book. I say "your book" because these letters have been evolved and illustrated entirely by your desire, the expression of which it has been an honour to receive, and a great pleasure to obey. As this book contains nearly the whole of the paper "On the Discovery of the Petrified Ruins of an Ancient Forest," I now beg you will allow me to add to it, in dedication to you, reprints of those other kindred papers on the coal-flora period, entitled "Cloud Hill," in which you have taken so much interest, and which I think should certainly be included in the same binding. And all these various papers and stories on natural history, and on geological, chemical, and astronomical subjects, which I have used as mosaic-work in your book, and which some critics will pronounce erratic, are strictly bits of Review of Modern Science and Modern Thought, so far as they go, although written long prior to Mr. Laing's work, which we have been more especially reviewing. In preparing the "Cloud Hill" papers for your acceptance as a supplement to this book I shall make some slight additions, but no corrections, as I find myself unable to alter any of the conclusions arrived at when writing the two parts—respectively fourteen and thirteen years ago.

As soon as this further trifling task is accomplished I hope at once to resume our correspondence on "Primitive Man and his Work," which this printing and supplementing has for some months interrupted.

Meantime, believe me, my dear Mrs. Anderson, yours very faithfully—

WILLIAM HENRY GOSS.

To MRS. W. H. ANDERSON,
17 The Avenue, Southampton.

CLOUD HILL.

PART I.

A PAPER

WRITTEN FOR THE NORTH STAFFORDSHIRE
NATURALISTS' FIELD CLUB AND ARCHAEOLOGICAL
SOCIETY, ON THE OCCASION OF THEIR EXCURSION
TO CLOUD HILL, NEAR CONGLETON,

MAY 20, 1881.

By WILLIAM HENRY GOSS, F.G.S., F.R.MET.S., ETC.

ON ANCIENT STONE CROSSES ;
ON THE ORIGIN OF MILLSTONE GRIT, CLAY, AND IRONSTONE ;
ON THE GEOLOGY OF THE CHESHIRE PLAIN ;
AND ON THE DEPOSITION OF THE FLORA OF THE
CARBONIFEROUS PERIOD IN THE COAL MEASURES.

REPRINTED FROM THE ORIGINAL PAMPHLET,
AS A SUPPLEMENT TO THE " REVIEW OF 'MODERN SCIENCE
AND MODERN THOUGHT.' "

1895.

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INTRODUCTION.

REPORT OF AN EXCURSION OF THE NORTH STAFFORDSHIRE NATURALISTS' FIELD CLUB AND ARCHAEOLOGICAL SOCIETY TO CLOUD HILL, NEAR CONGLETON. REPRINTED FROM "THE STAFFORDSHIRE ADVERTISER" OF 28 MAY, 1881.

"NORTH STAFFORDSHIRE NATURALISTS' FIELD CLUB AND ARCHAEOLOGICAL SOCIETY.

N the 20th inst. the above society made its second excursion of the season, under the leadership of Mr. W. H. Goss, F.G.S., F.M.S., the places visited being Rushton Church, The Bridestones, Cloud Hill, and Bosley Church. The party mustered nearly 60. At Rushton Station they were met by the Rev. Richard Smith, who accompanied the party to his extremely interesting little church, an ancient building, formerly called 'The Chapel in the Wilderness,' dedicated to St. Lawrence. Mr. Lynam, who was with the party, had kindly undertaken to speak about the church, and the President (Mr. W. Challinor, of Leek), in introducing that gentleman, made some very interesting remarks about the old yew trees in the churchyard and some quaint epitaphs on the tombstones, which he amusingly quoted. He also animadverted upon the ultra-conservatism of the people of Rushton in the retention of their comfortless old-fashioned pews, in some of which the occupiers were compelled to sit with their backs to the chancel. The President also commended the course adopted by the leader in furnishing members with his paper, entitled 'Cloud Hill,' in a printed form the day before the excursion, whereby they were enabled to learn beforehand the details of what they were going out to see, and could further study them afterwards at their leisure. He then introduced Mr. Lynam, who read a paper, in which, after describing the ancient woodwork of the church, he said: 'With these details before us, we have now a clear conception of what this

little building in its original state was, and seeing that it stood surrounded by vast woods, nothing could be more appropriate or sensible. The builders used the materials ready to their hand, and employed an inspired skill in designing and putting it together. It is fitting now we should address ourselves to the question of the date of this old timber structure. I much regret that a very interesting description of the church published by the Rev. Mr. Norwood and the Rev. Mr. Melland—the latter a former incumbent of the parish—is not in my hands for reference, but in his ‘History of Leek,’ Mr. John Sleigh quotes one of Mr. Norwood’s conclusions respecting it—namely, ‘that there is one ornament probably unique in England—namely, six dog-teeth cut in oak over the piers on the north side of the nave.’ The ornaments referred to are the carvings on the wall-plate at the east end of the north side of nave still visible. The dog-tooth ornament was not employed after the end of the 13th century, and regarding these carvings as examples of that ornament, as suggested by Mr. Norwood, we should learn from them that this church was erected before the year 1300. But before accepting this conclusion, we must be satisfied that ‘dog-tooth’ is the right term for these carvings. Every student of Gothic architecture will agree with me that the ornament referred to cannot be called ‘dog-tooth.’ Wherever these are employed the ornament is a continuous string of quatrefoiled leaves, all placed close to one another, as at Lichfield Cathedral, in the churchyard cross at Rochester, and elsewhere. Here, at Rushton, the ornaments are spaced with a considerable interval between them; are in fact what are called ‘pateras,’ which occur constantly in the 14th and 15th century, as well as in earlier work. So that the conclusion of Mr. Norwood (based on the existence of this ornament being dog-tooth) that this timber building is of 13th century date cannot, I think, be accepted. I do not know whether there is documentary evidence as to the erection of the first church, but turning to the existing work itself and especially to the western truss of nave roof, I should rather assign to it the middle of the 14th century, to which period the pateras on the north side, and the mouldings at the apex of the arched rib of the truss above referred to, and the chamferings and stoppings and general treatment of the timber work, would appear to me to more properly belong. Alterations made in the church in more recent years, happily for archæo-

logists, bear their own dates, and it is remarkable there should be so many dates given in this little building.' Mr. Lynam then proceeded to point out these alterations and to comment upon them.

"After a thorough inspection of the church and churchyard, the party ascended rising ground near the Crown Inn, whence there was a view of the Churnet Valley, remarkable in its resemblance to the Vale of Clwyd. Thence they proceeded to the Bridestones, where a paper prepared by Mr. J. D. Sainter, F.G.S., was read by Mr. W. S. Brough, entitled 'Notes on a Stone Circle called the Bridestones, near Congleton.' Among the remains of this venerable rude stone monument of antiquity the party then seated themselves to their *al fresco* luncheon, and afterwards resumed the walk towards Cloud Hill. On the south slope of Cloud they passed through the remains of an ancient British camp, with its usual rampart and fosse in a state of partial obliteration. Mr. Sainter has mentioned this camp in his 'Rambles round Macclesfield,' and says, 'What is left of this portion of the intrenchments extends in an oblique curve 790 feet in length, bearing due west to south-east. How far the fosse may have extended in this direction there is nothing to show, but part of another intrenchment, 180 feet in length, is observable, which denotes that the fortress has consisted of two divisions. At the north-western angle there is part of another intrenchment which extends due south for a distance of 285 feet, accompanied by a gradual curve of 36 feet, bearing south-east.' The ascent of Cloud presented scenes of increasing grandeur and beauty, and, the day being wonderfully clear, the magnificence of the view from the summit elicited exclamations of pleasure and admiration from everyone present, including some who had often made the ascent before, but never under a combination of such favourable circumstances. Under ordinary circumstances the leader's paper on 'Cloud Hill' would have been read on the summit, but as he had with generous forethought had copies printed and circulated beforehand it was taken as read. Mr. Goss, in a pamphlet of 35 pages, treats of 'The origin of millstone grit, clay, and iron-stone; the geology of the Cheshire plain; and the deposition of the flora of the carboniferous period in the coal-measures.' We purpose giving a fuller notice of the pamphlet next week.

"The view from Cloud on a clear day like that of the 20th of May is undoubtedly one of the finest to be seen in England. It

extends over or into nine counties—namely, Chester, Stafford, Derby, Salop, Lancaster, Denbigh, Flint, Montgomery, and a little bit of Merioneth. The magnificent plain of Chester and Salop is exposed to view throughout its whole extent right up to its western boundary of the Welsh mountains. Looking over the plain westward, the angular rock on which the ruins of Beeston Castle stand is clearly seen, 23 miles away, with the Peckforton hills immediately to the left. Beyond Beeston the horizon is limited by the long line of the Welsh mountains—the Clwyd range to the right. The highest point is Moel Faman, 1,845 feet high, and 48 miles distant, in Denbighshire. To the right of Moel Faman are Moel-y-Cloddian, 1,452 feet, and Arthur's Camp, 1,491 feet, both in Flintshire. Slightly to the left of Beeston were seen the Berwyn mountains in Montgomery and Merioneth. The highest, Cader Berwyn, is 2,715 feet high, and more than 50 miles from Cloud. This group includes the Barber's mountain at Llangollen, and is easily distinguished by its superior height. To the south-west a group of three very steep sharp-pointed peaks were visible—namely, the Breidden hills in Montgomeryshire, 1,200 feet, distant about 55 miles. Farther to the left, and almost due south, was seen a range of hills, being those near Ludlow, the chief of which is the Titterstone Clee, 1,805 feet, 58 miles distant from Cloud, and between those and the spot of the horizon formed by Mow Cop towered the Wrekin, 1,320 feet, about 38 miles distant. In the bosom of the hill-country eastward of Cloud rested the lakes of Rudyard and Bosley, with a background composed of Shutlingslow, the Bosley Minns, Roaches, Axe-edge, and other mountains ; while in the plain to the west and north, visible chiefly by their smoky atmosphere, were scattered the towns of Manchester, Stockport, Warrington, Runcorn, Macclesfield, Congleton, Sandbach, Crewe, and Nantwich. The party lingered long upon the summit viewing this magnificent panorama, until at length the gaze became directed more and more towards the village of Bosley, where it was known that tea was being prepared at the Queen's Arms Inn. A scramble down the hill and another little walk of a mile and a half through a lovely bit of country brought the party at length to the desired tea table, where the excellent and ample provision made was universally appreciated. Tea being over, the usual business of election and nomination of members was gone through ; after which Mr. Arthur

Leech proposed and Mr. W. S. Brough seconded a vote of thanks to Mr. Goss as leader.—This was accorded with unusual honour and emphasis. The party had already been welcomed to Bosley on its arrival, by the Rev. Alexander C. Fraser, the vicar, and that gentleman now received them in his beautiful and comfortable little church, which has been recently restored. Mr. Lynam delivered an interesting address on what remains of the ancient masonry, the bells, the old pulpit, and other matters. Before leaving the church, the Rev. Richard Smith, of Rushton, proposed a vote of thanks to Mr. Lynam for his two addresses during the day, and gracefully acknowledged that gentleman's great knowledge of matters connected with ecclesiastical architecture, and his ability and kindness in communicating the same, from which the speaker had that day derived much pleasure. This vote being seconded by Mr. Goss and passed, Mr. E. Earl, ex-president, proposed that the thanks of the society be accorded to the Rev. Richard Smith, of Rushton, and the Rev. A. C. Fraser, of Bosley, for their kind reception. This being seconded by Mr. Arthur Leech and passed, there remained nothing to do but to walk leisurely to North Rode station, where the saloon carriage awaited the 8 p.m. train to Stoke. And thus terminated an excursion which was generally pronounced at the close of the day to have been one of the most enjoyable and successful that the society had ever made. There were showers during the day, but the party had all the benefit of them in their cooling and air-clearing influence without any of their inconvenience. They invariably came down when members were sheltered either in train, church, or inn. It was these obliging showers, followed by bright sunshine, which rendered the view from Cloud so remarkably clear, and when the leader was congratulated on securing this favourable weather for his excursion he replied that he did not see much use in being a Fellow of the Meteorological Society if such a matter as that could not be arranged for such an occasion!"

CLOUD HILL.

PART THE FIRST.

AS MOUNT PISGAH.

Tr is interesting to reflect that the site of the lovely Vale Royal of England, stretching westward from the base of this mountain, was once the basin of a Dead Sea. The salt of that Dead Sea lies now buried beneath the fertile soil of this plain, and we look westward from Cloud, as the leader of Israel and his attendant princes once looked westward from Mount Pisgah, upon a land flowing with milk and honey, because a land, emphatically, of rich pastures and of flowers, but with its Dead Sea not only dead, but buried. And, curiously enough, yonder to the north, passing through Macclesfield, is a river which used to be called the river Jordan. It is now known as the Bollin. Indeed, we look from the summit of Cloud upon a scene which, in this merry month of May, is scarcely surpassable in its beauty. It is loveliest nature in its loveliest bridal costume and joyous freshness ; sweet in vernal perfume and vernal song. But I shall have nothing to say of its birds and its flowers. You may learn all about them in Mr. Sainter's valuable little book, entitled "Rambles Round Macclesfield." There, too, you must look for the archæology of this plain, and of these hills, for I shall leave that also to him. In the front of his book is a map, geologically tinted, and shewing among other interesting things, the numerous ancient tumuli, the dolmens, the stone circles, the pillars, the cairns, the supposed vestiges of the Ancient British camp through which we passed in ascending this hill, of another on Comb's Moss to the north-east, of a Roman camp in the plain a little north-ward of west, at Hulme Walfield, another at Toot-hill to the north-east, and the ancient Celtic stone monument called

the Bridestones, at the southern base of this mountain, which we have just examined. Of this stone monument, Mr. Sainter has not only written in his "Rambles" but also in a special paper printed in Mr. Llewellynn Jewitt's last issue of the "Reliquary" (Vol XXI, p. 197). And in mentioning the ancient dolmens or altars, the stone circles and the cairns of the country around us, we are again reminded of that other land flowing with milk and honey, seen from Mount Pisgah—both the plain and the hill-country—for these dolmens, circles, cairns, and pillars, are truly relics of the worship of that same Baal, or the Sun, whose altars and pillars were set up in the groves and the high places of the land of Canaan, the destruction of which was commanded by the prophet who looked forth upon them from Pisgah; but against which Judaism warred with incomplete success. With like incomplete success did Christianity war against the Sun-worship connected with these stone relics around us, even down to the eleventh century. Mr. Fergusson, in his "Rude Stone Monuments," quotes from a decree of a council held at Nantes, in which there is an exhortation to "Bishops and their servants to dig up and remove, and hide in places where they cannot be found, those stones which in remote and woody places are still worshipped, and where vows are still made." But, as I have remarked in the fourth chapter of "Arbor Low," all the efforts of the bishops and their servants failed to remove those objects of worship, as did all the efforts of Moses and the prophets, and, four hundred years after the passing of the above decree, we find king Canute trying his authority against "the barbarous adoration of the sun and moon, fire, fountains, stones, and all kinds of trees and wood," with equal failure. At length the Christian Fathers appear to have given up the contest; but, with the wisdom of the serpent, they ultimately subverted the original symbolism of the menhir, by calling it a CROSS, and permitting the people to pray to it or at it as such. And thus we have throughout Christendom many titular crosses, which are not crosses but menhirs. The sacredness of this symbolic stone of old gave solemn inviolability to a contract made at its foot; and, curiously enough, to this day men and women continue to assemble to do business and make contracts around the Market Cross, often the relic of the sacred menhir. It is more than probable that many of the venerable stones or pillars called Crosses, still lingering in the land and throughout Christendom, were worshipped

in the early Flint period as the emblems of the Sun's beam, or of Light and Fire ; and, in succeeding ages of Metal, were shaped and sculptured more or less as we find them. And who among us dare affirm that he has none of the old Paganism left in his nature, derived, perhaps, from his undoubted Pagan ancestry, whereby he yet venerates these dear old monuments of barbarous antiquity ? Certainly not the antiquary ; certainly not the writer of " Arbor Low."

Of Sandbach, a town yonder to the west, beyond Congleton, I think Mr. Sainter has said little or nothing, and I will but quote a curious passage relating thereto, from that ancient chronicle, " King's Vale Royal of England " :

" In the market-place do stand, close together, two square Crosses of stone, on steps, with certain images and writing thereon engraven ; which, as they say, a man cannot read, except he be holden with his head downwards ; and this verse (as they hold opinion) is engraven thereon :

In Sandbach, in the Sandy Ford,
Lieth the ninth part of Dublin's hord.
Nine to, or Nine fro,
Take me down, or else I fall.

" They also affirm, that the said crosses were set up there before the birth of Christ ; but that is not so, for the story of the Passion is engraven thereon ; but whether the said verses are written thereon, or no, I know not. Certain I am, that on Sunday morning, the 1st of November, 1561, there were three chests made of tin, or suchlike metal, found near the said river, but nothing in them. On the covers were certain letters, or characters, engraven, which chests were carried to the sheriffs."

Now, it would be interesting to know if those two chests are still in existence. By tin, is not to be understood tinned iron, of course, but solid tin. It would be curious to examine those unknown " letters or characters," and see if they were Phoenician, or possibly, even Celtiberian letters. There was a tin tablet of kindred interest found buried within the circle of Stonehenge, in the reign of Henry VIII., inscribed with many letters of a strange character that neither Mr. Lilly, Master of St. Paul's School, nor Sir Thomas Elliot, an antiquary of great learning, could make out. The writer in " King's

"Vale Royal" is not very logical in declaring that the stone crosses of Sandbach were not of pre-Christian origin because they were engraved with the story of the Passion. I have already stated that the early Christian fathers found it expedient, ultimately, to compromise with the ancient people of this land in their unconquerable veneration for their menhirs, or obelisks—symbols of the sun's ray—and to call these menhirs crosses, although they were really tapering obelisks; and to permit—what they could not prevent—the continuance of the worship thereof, but under the new Christian title. Afterwards some of these ancient monuments received Christian sculpture.

It is, I believe, the prevailing opinion among antiquaries that these crosses were introduced originally in the southern and western parts of England, and travelled slowly northward. That is very probable, but it was not in Christian times. That form of what we call the Cross, which is really the obelisk, is universal, and had prehistoric origin in all prehistorically inhabited lands, from the rude unchiselled menhir, to the beautifully elaborated Needles of Egypt and Peru. Mr. Alfred Rimmer in his interesting book entitled "Ancient Stone Crosses of England" adopts the orthodox supposition that these Sandbach Crosses were raised on the spot where a priest from Northumberland first preached Christianity; and many other such crosses are thought to have had a similar origin. But it is not at all likely that the exact spots were the first persecuted preachers of the gospel stood, had there been no monument already there, would be so noted, to be so honoured, by the villagers or authorities who hated and pelted the innovators. There is no doubt that the early preachers of Christianity addressed audiences, when permitted, from the foot of the sacred obelisk, because that was the nucleus of the gatherings of the people, and the holy spot whence their priests and orators addressed them on public occasions. Therefore I should say that the preachers stood there because the menhirs were there, and not that the menhirs, or crosses, are there because the first preachers stood there. At any rate such stone monuments are found in various parts of the world where no priest of Christianity was ever known to have harangued the people. And Mr. Rimmer's statements of facts are at variance with the orthodox assumption respecting the preacher-origin. He says: "There is a singular resemblance between the architecture of these crosses and other remains of antiquity of which

history leaves us in the dark. The Runie sculptures have a strikingly Eastern appearance." Also, "this ancient architecture appears in China, and on some Pacific islands long deserted ; it is strongly developed in Hindostan among the ancient ruins, and there are many traces of it in the older cities of Italy, which had arrived at a high state of civilization long before Rome was built. The coincidence of design is curious, but the cross at Carew, or the Runie stone at West Kirby, might easily pass for stones from the farthest East." And further on he says : " It is a very singular circumstance that on a cross at Kells, in Ireland, the sculptures of which resemble those on the large cross at Sandbach, there are undoubted Roman knights and horses, and a very perfect centaur with a bow in his hand. The crosses in Ireland it is needless to remark, are very much more ancient than those in England." This Irish cross with its centaur cannot be supposed to have had Christian origin.

My present work, however, is chiefly geologic rather than archæologic ; and, first, I will speak of the geology of this Cloud Hill on which we stand. Mr. Sainter is in the habit of giving the derivation of the names of places mentioned in his book, and of Cloud Hill he says, " From 'clud' rock (Anglo-Saxon), and 'hyl,' a mountain (Anglo-Saxon)." And we shall presently be speaking of Mow Cop, yonder to the south-west, as originally part of this "hyl" or range, and while we are on the subject of the derivation of the names of these places let me refer to the origin of that name also. Mr. Sainter speaks of it as derived from "Mau" and "Cop" or "Copt," Anglo-Saxon for a Lofty Summit. At first sight this looks very correct ; and Mr. Sainter is remarkably correct as a rule. But on old maps in my possession the name is printed Mole Cob. We have several mountains of Wales called Moel, and there are the Mulls of Scotland. The Cheshire peasantry habitually drop the l in pronouncing such words. There is a lofty bit of rock on Mow Cop which the natives call "Th' Owd Mon," meaning the Old Man. They call a fool—*few*, school—*schew*, Hassall—*asser*, Tunstall—*Tunster*, Malkin's Bank—*Mawkin's Bonk*, Mole or Moel—*Mow*, and so on all through their vocabulary ; and Cob they have changed to Cop. They have evidently a great aversion to l. It is not improbable that the mole itself derived its name from its occupation of raising heaps or moles. So Mow Cop is a local pronunciation of the old name written Mole Cob, having the same

signification as the Anglo-Saxon "Mau Copt"—A lofty summit—but probably not derived direct from the Anglo-Saxon, and meaning more exactly "The top of a heap," Cob and Cop both signifying The Top.

Mountain as it is, Cloud is but a piece of the edge or rim of a great basin, of which Congleton Edge and Mow Cop are continuations to the south-west, and the opposite broken down rim is Biddulph Moor, direct south, the basin enclosing the Biddulph coal-measures. Now the rock of which this mountain and this basin are composed, is Millstone grit. And what is Millstone grit?

THE ORIGIN OF MILLSTONE GRIT, OF CLAY, AND OF IRONSTONE.

N this month of May, in 1877, some of us made an excursion to the range looming up yonder in the South-west—Congleton Edge and Mow Cop. In writing a report of that excursion, I thus described the Millstone grit :

"The true difference of structure of an ordinary sandstone and a Millstone grit appears to be rather vaguely understood, even by teachers of geology. Indeed, if the word *sand* applies to all finely-pulverized stone, without regard to the form of the particles, then Millstone grits may be termed also sandstones, although all sandstones are not Millstone grits. The latter rocks obtained their distinctive appellation before the science of geology was thought of, because of their singular economic value as yielders of millstones; and the superiority of these millstones lay in the greater and keener abrasive power which they possessed, compared with ordinary sandstones. And why is that so? A magnifying glass will shew. Ordinary sand, whether of the sea shore or the desert, will be found, on examination, to be rounded in its form by the motion to which it has been subjected, whether of wind or water, air or ocean. It is miniature shingle, with all angularity worn off, just as with the larger flints and other pebbles of the sea shore. Sandstones are the sands of long past ages, cemented into coherent rock by a solution, generally of silica, lime, or barytes, permeating the porous mass, and afterwards dried to crystallization. But the quantity of cementing matter has

not been sufficient, generally, to entirely fill up the interstices of the sand. Hence it is that the sandstones and grits disintegrate by exposure to rain and frost. Such sandstones abound in pebbles of various sizes, which will also be found to be generally rounded. In examining the structure of sandstones, care must be taken to distinguish between the original form of the sand and that presented by the adherence of the matter of cementation which held it together as sandstone, and may give it, at first sight, an appearance of angularity. The Millstone grit, on the contrary, is composed of angular fragments of silica, whether minute or large, and it is the angularity of its original particles which gives it its superior abrasiveness as a grinder. And, just as the larger stones or pebbles of the sandstones are rounded, correspondingly with the minute constituents of the rock, so the larger particles of the Millstone grit are angular, correspondingly with its minute constituents; the whole mass having evidently been pounded, and then left at rest, or free from the gentle motion produced by air or ocean, with which it must inevitably have become *rounded*. As in the proper sandstones there are occasionally and exceptionally found angular fragments of stone, the recent breakage of wave force before the mass was left at rest, so in the coarse grit-rocks there are occasionally and exceptionally to be found rounded pebbles which have escaped the general crushing and pounding of the silicious gravel, by whatever sudden and violent force of nature the material of the Millstone grits was produced."

I should here remark that in some masses of Millstone grit, of fine and generally uniform grain, there are imbedded, and curiously scattered, some rounded pebbles of quartz, whose anomalous condition and presence it is difficult to explain. At that time (1877) the angularity of the particles of Millstone grit was a mystery to me. It could not have been produced by the action of frosts upon solid rocks of quartz: that is impossible, solid quartz being impervious to moisture, and, consequently, to the splitting influence of frost. And the idea of such a brief, but mighty pounding force as would be necessary to cover so large a surface of the earth with such enormous quantities of this angular detritus was too terrible to entertain in connection with a period of the earth's history subsequent to its Life Dawn, not only vegetable, but animal. Such a pounding must

have utterly destroyed the dawning life of the globe, and would appear altogether inconsistent with the Plan of Creation, gradually and wonderfully developed, which the geologist, above all other students of nature, beholds with admiration and awe in its vast stupendousness and wisdom. And that this pounding did not take place at the period of deposition of the Millstone grit on this spot we are certain, because the young life of the earth was *not* destroyed, and in these rocks there are fossil limbs of trees with their beautiful bark decorations undamaged, and their hollow roundness filled with the same grit. I shall now be able to shew, pretty conclusively, that this angularity was brought about in a hypozoic epoch, when there was no Young Life to destroy, and when it was the necessary part of the Plan of the Creator to break up and blend together in small grains, throughout the entire surface of the globe, those materials which in their after decomposition and solution should make possible in due time the eozoic period, or Dawn of Life, by affording, in general dissemination, some of its essential elements of organization and the necessary soil for its growth. Without such a granular blending of the elements of the earth, the universal combination of those elements, necessary to the structure of plants and animals, would have been apparently impossible. That hypozoic period was the period of the formation of the granitic and porphyritic rocks, of which the Millstone grit is undoubtedly the silicious detritus, and which detritus rests beneath our feet at this moment not far from the site of the original granites and porphyries and basalts, as I shall be able presently to shew.

But, first, let me lead your attention for a brief while from this mountain of grit to the mountains of granite in Cornwall. In that county the same thing has happened in the distant past that has happened here, the granitic rocks have decomposed, resulting in the formation of masses of Millstone grit; but, what is more to our purpose, that process of decomposition has not yet ceased in those regions, and there we can witness, in operation to-day, nature's mode of utilizing for the purposes of life, the granular stores which she laid up for future use in the earlier days of the history of this planet.

In the year 1869 I visited the counties of Devonshire and Cornwall, and the Isle of Purbeck in Dorsetshire, to study the origin of clay. In Devonshire and Cornwall, as you all know, there

are masses of granite in which the grains of felspar have become de-crystallized and changed to soft clay, called china-clay. The potass of the felspar, as soon as water reaches the mass, dissolves and forsakes its ancient fellowship, carrying with it, however, its own aqueous saturation of silica. I say aqueous saturation, because it has an igneous saturation which is immensely greater. It was for the very purpose of this ultimate liberation, laden with silica in solution that the potass was ever crystallized in the felspar, and the felspar pounded into grains and scattered throughout the granitic crust of the earth. In that liberated solution the potass and the silica hasten away over the land, and soak the earth, to fulfil their destiny in contributing to vegetable sustenance. And the clay which is left behind is also ready now to begin to perform its share of duty, planned in the original creation of felspar, by becoming a constituent of the soil and the medium of nutrition, also of vegetable life. Now, although the felspar of the granite is thus decomposed and changed to clay, the angular grains of quartz, the particles of mica, and the ferrous minerals remain entirely unchanged. A flood washing these disintegrated rocks carries away the clay in fine suspension, and leaves the other minerals assorted according to their weight, and spread out in its course. The period of sudden deluges occasioned by earthquakes and the upsetting of lakes from out their basins over the surface of the earth has long ceased in this land ; but there were periods, prolonged periods, when the decomposed felspathic rocks were thus mightily washed, and the clay separated from the mass to be deposited in hollows, shallow or deep, wherever the clay-charged waters ultimately found temporary rest. A large proportion of these felspathic rocks contained fragments of ferrous minerals, which, when liberated from the granite, or basalt were, on account of their greater specific gravity, left together in masses, while the lighter quartz was washed beyond, the coarsest grains subsiding earliest, the finer later, and the finest of all still farther away in crowded company with the light flakes of mica. The ferrous minerals at that period were, as they still are in granites and basalts, generally in a condition of either blue protoxide or greenish black magnetite. When subsequent less violent floods disturbed the surface, with a blending rather than an assorting force, the white clay and the finest particles of the ferrous minerals, with the finest of the grit and mica, and the

muddy detritus of the Mountain-limestone, which also formed part of the Carboniferous horizon, were mingled together and spread out in the hollows of the valleys. This mixture constituted what we call Blue and Grey Marl, and was the fruitful soil of the luxuriant Flora of the Carboniferous Period. Subsequently the ferrous minerals which were left in heavy masses exposed to air and moisture—to air, mark, which was becoming daily less charged with carbonic acid gas, and daily more charged with oxygen, through the enormous solidification of the carbon in vegetation—became decomposed in the process of per-oxidation into rust and earth. They became a fine soft red or brown mass, and mingling in larger proportion with the constituents of the Grey Marls, formed the Red Marls which are so abundant throughout the earth. These ferrous minerals also became Iron-stone when combined with only a small proportion of the earthy detritus of the granite and Mountain-limestone. Now it is certainly true that all clay, properly so called, is the result of the natural de-crystallization of felspar or agate, or rocks composed of silica and alumina, and cannot be produced by attrition or trituration. This is an important declaration ; and I repeat that the clay-producing rocks are those only which contain silica and alumina in crystalline combination, and nature only, by de-crystallization only, can produce true clay from these rocks. You may grind the felspars and agates to the finest creamy condition, as gritless as flour between the teeth, but the result will not by any means be clay. The potter could not work it either on his wheel or in his moulds, like clay. Its atomic structure would be different to that produced by natural de-crystallization. It is to the alumina that we are indebted for the plastic character of clay, and in that ground felspar we have not the alumina in its natural mechanical condition ; grind as you will, it retains its chemical alliance with the silica and potass and the mechanical character of felspar. But although ground felspar, or any other triturated rock will not produce true clay, the plasticity of true clay will admit the addition of certain proportions of these ground rocks without materially altering its plastic nature. How nature brings about this de-crystallization so quietly and surely in the depths of the still rock we cannot at present say. It is certainly the reversal of her process of crystallization, which is probably effected by the agency of electricity. Mere atmospheric influence has nothing to do

with it. It goes on many fathoms deep in the heart of the mountain of granite or conglomerate, and where air and carbonic acid have no free access. It leaves the other grains of the rock unchanged—the quartz, the soft mica, and even the iron, if that be present. The iron is not even carbonated during the process, but continues of the primitive granitic nature of protoxide or of magnetite. And even if carbonic acid should be a suspected agent in the case of felspar, because of its affinity to potass or soda, it cannot be suspected in the case of similarly decomposed agates, which contain no alkali. Besides, potass has a greater affinity for alumina than for carbonic acid, and as the carbonate of potass will part with its carbonic acid to unite with hydrous alumina, carbonic acid could not decompose an aluminous rock to combine with the potass of that rock. It is impossible that so feeble an acid should perform such mighty and unnatural work, and the element of disintegration is evidently not the alkali, but the alumina. As nature's mode of operation in the de-crystallization of rocks is a mystery to us, so, because of our want of knowledge in the matter does it appear in some degree erratic ; or, more probably the crystals were erratic in their composition ; for in some lumps of decomposed granite in which the bulk of the felspar is changed to clay, some grains thereof remain quite unchanged. And with the agates, too, in some instances the exterior to a certain depth, and the very core of the stone also, will be perfectly decomposed, with a layer of unaltered crystal intervening. Also in regions where the granite rocks are generally decomposed, some masses, or fragments, escape entirely, while others become merely de-cemented and crumble into the separate grains of their original composition. It should therefore not be a matter of surprise that in regions where granitic and porphyritic rocks once formed prominent features, as once within the horizon of this Cloud Hill—judging from the detritus beneath and around us—there should yet remain some local survivors, venerable Rocks of Ages indeed, whether of a thousand tons or a thousand grains in magnitude.

The earlier formed clays of the carboniferous and pre-carboniferous periods have probably all been shifted by successive floods occasioned by plutonic disturbances of the horizon, and have been blended, and re-blended, with all those elements which render possible the varied floral life of recent times. But there are deposits

of clay of Oolitic and Miocene dates which have not been thus re-washed and re-deposited, although their strata have been fearfully rent and twisted and overturned *in situ*, by the earthquakes of those and subsequent periods, even in this land of ours. Such are the deposits of the Isle of Purbeck in Dorsetshire, and of Bovey Tracey in Devonshire. There is at the bottom of each stratum of clay, at Purbeck, a deposit of quartz, varying in fineness, which was sufficiently small and light to be carried with the clay-charged waters, the coarsest of which sank the moment the basin was reached, then the finer, and finest, in natural order, or assortment, of deposition, the fine clay above all. The iron, being heavier, was left behind somewhere on the road, in the direction of the source of derivation of the clay, wherever that may have been—but it was not far away—and became decomposed by peroxidation. Subsequently, when the clay had all settled down in the basin, another flood came from the same direction as before, into the same lake, and came with sufficient force to carry with it the oxide of iron and the coarsest particles of grit which had previously been left behind, and deposited them as a band of iron-ore on the top of the fine strata of clay. Other floods later on brought the grit in such abundance that the basin was ultimately entirely filled up with it. If it be asked how can I tell that the clay did not travel far from its original rock of derivation in that flood, I reply that its purity is its evidence. Had it travelled far over the surface of a ferruginous region like ours the flood must have taken up and blended with the fine white clay other foreign substances, especially ferruginous clay or sand.

There is, unfortunately, so much to be done and said to exhaust and fortify a subject, if I may be permitted to use so contradictory, yet proper, an expression, that I fear I must yet say a word or two more on this subject of the deposition of clays. I have spoken of the natural assortment of grains of matter by the rule of specific gravity in deposition in still waters, by which the coarsest or heaviest is always at the bottom, and the lightest or finest always at the top. To my surprise, when I left the Purbeck beds to examine those of Bovey Tracey in Devonshire, I found this rule reversed, the finest matter being at the bottom and the coarsest at the top; and, having discovered the reason, it is desirable that I should explain it here. The deposits of clay which enter from the Bovey basin into the

parish of Kingsteignton at the north-east, and continue through it to the south-west, a distance of about three miles, and pass under the river Teign into the parishes of Teigngrace and Woolborough, are very properly called on the spot "clay streams." And this expression suggests the explanation of the reversal of the specific-gravity rule of the clay-lakes or basins. These deposits of Kingsteignton and adjoining parishes were made from waters which, being suddenly charged with the clay and grit, found their way into this trough or channel, and then flowed gently on, like the artificial clay-streams of Cornwall, depositing, as they went, the coarsest material higher up at one end of the stream, and the finest at the other in a trough, farthest from the source of derivation, probably Dartmoor. But inasmuch as the stream continued to flow after it had deposited all this matter, succeeding waters would continue to move forward the finest grit first upon the fine clay and cover it up, and so on in order of specific gravity of the grains, until the coarsest became uppermost and the trough was levelled up. At Bovey Heathfield there are alternate deposits of clay, sand, and lignite of a very interesting character, which I had not the opportunity to examine. But Mr. Pengelly, commissioned by the Baroness—then Miss—Burdett-Coutts, made a careful examination of them in 1860, the general results of which were given in a paper read before the Royal Society by Sir Charles Lyell. Nine years later, Mr. Pengelly very kindly searched back for me among his original M.S. notes made on the spot, in reference to the order of deposition of those beds, and informed me that those notes record, in most instances, the same order of deposition that I had observed at Purbeck, while in some few cases he had noticed just the reverse. The two conditions evidently indicate respectively lake-deposition, and stream-deposition, which distinctions will help us further on.

Now let us return. In the Millstone grit of these Cheshire and Staffordshire hills and basins, and in the coal-measures resting in the latter, we have all the detritus of granitic rocks. The grains of the grit are the same in their composition, in their angularity, and in their varied size, as the grains of quartz left after the washing out of the clay from decomposed granites. The glittering mica is disseminated through this Millstone grit, just as it is disseminated through the other detritus—sparingly among the coarser grains, crowdedly among

the finest grains. In the West of England detritus, after it has been washed by man's guidance of the mountain stream, some of the clay still remains adhering among the quartz ; so in the interior of this Millstone grit you will find, almost invariably, clay in the interstices. It is often pure white china-clay, and more often tinted with oxides of iron, resulting from the oxidation of the finer fragments of ferrous mineral which were not heavy enough to stay behind in denser ferrous company, when the decomposed granite was washed by natural floods, and its loose constituents partially assorted. These oxides assume all the beautiful colours of which ferrous oxides are capable—yellow, fawn, scarlet, brown, pink, purple, green, and blue. But in many places, as I have said, the clay in the interstices is pure white china-clay. In the West of England detritus of granite, we find undecomposed grains of felspar which have escaped decrystallization ; so in some localities we find crystals of felspar mingled in this grit. In some masses of this grit there is so much felspar, as to shew that the granite was merely decemented, and its felspar not decomposed at all, and the quartz and felspar remain in company in about their original proportions, because of their almost identical specific gravity, while the denser ferrous mineral has been left behind, nearer the place of derivation, and the lighter mica has gone before, farther away, except a small proportion which was held captive and pervades nearly the whole formation, as the finest ferrous particles do also. In other masses, on the contrary, masses of thousands of tons in bulk, there is not a particle of felspar, the whole has been decrystallized. All this has been proven by the potter in his utilization of these rocks. In the plain below, there are many boulders of compact granite, and also many others in the condition of mere decementation, ready to crumble at a touch. You may now ask, what has become of the enormous quantity of clay which must have been liberated to leave behind so great a mass of quartz ? A large proportion of that clay has gone to constitute the marls in combination with the muddy detritus of the mountain limestone, which marls have been distributed and redistributed in every geologic system succeeding the Carboniferous, and a portion of that clay now remains included in the Carboniferous itself, forming the shales and marls of the coal-measures, north, east, and south of this mountain. The magnesia found in those marls is derived from some of the mica

of the granite which accompanied the clay ; and even some of the potass of the original felspar is included in the coal itself ; and it is that potass which, ascending as an anhydrous steam of alkali from the burning coal, corrodes the brick-work and iron-work of furnaces, ovens and kilns, and by repeated action causes that brick-work ultimately to melt and trickle down like lava. We will now consider what reasons there are for supposing that this mountain of Millstone grit is not far from its original granitic site.

If the Millstone grit had travelled far, it must have travelled, not in the condition of solid mountains and plains, but of loose grains impelled by water ; and in that operation the grains, travelling in such multitudes in their own heavy abrasive company, must have lost much more of their angularity than is the case with this grit ; for the abrasion of the particles one against another must have been very considerable, especially in the larger fragments. And the effects of the locomotion of this great granular mass in the tumultuous Carboniferous Period, are not to be estimated at the same rate as the effects of the journey of a few small grains of grit along a gentle stream of the present day. Further : If this grit had travelled a long journey it must have been more completely and uniformly assorted in the size of its grains by the specific gravity thereof. There are evidences of streams having run through the mass making this natural assortment in their progress and within their limits, but, in general, the regions of grit present no more such assortment than would result from the transport of its grains down a mountain side, and four or five miles into a plain such as that before us. In many masses there is an agglomeration of large and small particles, as though the original quartz grains of the granite, and even the small silicious particles of cementation had never parted company, this could never have happened after a long journey by the impulsion of water, for the same aqueous force which would be necessary to carry the heavy grit a great distance, must inevitably have carried the lighter materials of its composition a much greater in any open sea or great river. By the same rule, the finest mica being so much lighter than the quartz, must have left the company of the latter altogether and have been washed far in advance of its finest grains ; whereas we find the mica sparkling throughout the mass, sparingly in the coarser, and more abundant in the finer, such as would result from the limited journey

which I have named. Further: The clay of the decomposed felspar must have been washed clean away from the grit, while in fact there is much clay adhering to the grit and filling up the interstices. Some, and much, of this clay, as I have already mentioned, is pure white; other is tinted variously with oxides of iron, resulting from fine particles of the ferrous minerals of the granite remaining in the mass, and oxidizing *in situ*. One more reason is this: Had the grit travelled far we should never have found quartz and felspar together in great masses in proportions similar to that of the original granite; for, although they are of similar specific gravity, they must have parted company in a pell mell long journey. Finally, we cannot imagine this enormous quantity of matter travelling a long distance over the face of the earth—and it must have been a sea-bottom if anything, or a river scores of miles wide—without taking into its society much foreign matter, and here we find nothing but the detritus of granitic, basaltic and porphyritic rocks, except coal and floral fossils which will be referred to when I come to speak of the origin of coal. And, after all, against all the above reasons there is not even one to assign why this detritus of granite must have come from afar. Granitic rocks were once universally distributed over the face of the globe, and their decomposition ordained everywhere, as a part of the Plan of Creation for the embodiment of future Life.

Examination leads to the conclusion that the Millstone grit was washed from the decomposed hills of granite into the plains, which have since become mountains, and the lighter clay still farther away into still deeper hollows, even as much detritus of this grit itself, since it was elevated into mountains, has been washed, in its turn, into the Vale of Cheshire stretching before us. The undecomposed blocks of granite, basalt, and porphyry would, by their mere weight, remain longest of all *in situ*, and would be the last to reach the plain, and then it would be to rest on the top of the debris of the formation of which they were the survivors.

SOME OBSERVATIONS ON THE GEOLOGY OF THE CHESHIRE PLAIN.



LET us now direct our attention briefly from this mountain to the plain below. Let us, metaphorically speaking, turn up that lovely carpet and glance at the floor beneath it. I shall not waste time in describing the

details of its geology, which are already so well known, having been worked out so excellently well by those able pioneers of the science, Professors E. Hull and A. H. Green in their "Memoirs of the Geological Survey of Great Britain." We may congratulate ourselves, as a Society, that those eminent Geologists have acknowledged valuable assistance afforded to them, in the compilation of their important work, by some of our own members, Messrs. Sainter, Wardle, Molyneux and Ward. I will, however, repeat here what I have written before, in reporting Sectional excursions, respecting—

The Great Red Rock Fault,

a great crack in the earth extending from the north about five miles north of Stockport, thence southward along the western base of this mountain, Congleton Edge, and Mow Cop, and branching into two cracks, the western branch passing Market Drayton, and extending ten miles further south-west ; and the eastern branch going south-west for about three miles, when it is lost sight of just west of Audley, and reappears about five miles lower down. In 1877 some of us, under the leadership of Mr. Sainter, paid a visit to Congleton Edge. Walking from Mow Cop station along the Astbury Road, we crossed the railway at Ackers' Crossing, and proceeded to Wood Farm House. It is necessary here, for the benefit of the student of the Ordnance Survey Map, to point out some errors which have crept into sheet 81 S.W., on which, at the lower left-hand corner, the land traversed in this excursion is mapped out. It will be seen that our road lay, first, over the Lower Keuper Sandstone formation, past Ramsdell Hall, then over the Red Marl, both belonging to the New Red Sandstone series, past what is marked on the map as Wood Farm, on the left, or west, of the road. That farm, however, should have been marked Old House Green Farm, and that on the opposite, or east, side of the road should have been marked Wood Farm, instead of, as on the map, Old House Green. The Wood Farm buildings are, however, higher up, and are indicated by two small dots under the word "Hill," of "Tinker's Hill Wood." That Tinker's Hill Wood is, really, on the opposite or west side of the road, and extends beyond the canal towards Matterstall. Wood Farm derives its name from the neighbouring "Grotto" and "Quarry" woods. Our first destination was, as I have said, to Wood Farm House, which

is reached by turning a little aside to the right, out of Ackers' Crossing lane. There Mr. Sainter led the party into a disused quarry for the examination of some fine sections of the New Red Sandstone, topped with a layer of Drift. We then returned to Ackers' Crossing lane, and proceeding a few yards farther on towards Grotto Wood, the leader paused, and told us we were standing exactly on that great land-crack called the "Red Rock Fault." There we could stand with one foot on the Lower Keuper Sandstone formation, and the other on the vastly more ancient Carboniferous Rocks.

By removing the weathered surface of the bank, which is formed by the cutting of the lane, the fault was very distinctly seen, the surface of dark Red Sandstone—Lower Keuper—being reared, straight and sharp, against the crumbling dark gray shales of the Coal-measures. These crumbling shales set me thinking why this fault had occurred just where it has. A glance at the geological map will show that this crack is the boundary, on this side, of the great Cheshire Plain, which along this line, broke, slipped, and sunk away from the eastern country, whose foundations remained firm; and which eastern country, although since then so much denuded and worn down by sea action, while the Cheshire Plain has been largely raised by the detritus, remains yet greatly elevated compared to the latter, and is the hilly and mountainous country of North Staffordshire and Derbyshire. There was, of course, a reason why the earth cracked and sank down just where it did, along this line, and we will seek out that reason. The crack is so fine, that is to say, the unmistakeable strata of later deposition terminate, and fit so closely against strata of unmistakeable early deposition, that the suddenness of the great landslip, and the rasping together of the sides, without any chasm in the crack, is evident.

The crack will be seen to run along the lower part of the slope, or anticlinal, of which Congleton Edge and Mow Cop are the summit; and a little consideration of the strata will leave no doubt that when the Cheshire Plain sank, it left, either in the air or the sea, a black lofty cliff overlooking it, and facing the setting sun, banded at the top with a mottled section of New Red Sandstone. Why a *black* cliff, I will explain hereafter; and why a band of sandstone above, is because we find the latter formation in the sunken plain edging

closely, or abutting against the older strata, and there must have been the same above from which it was fractured. The Red Marl of the Cheshire Plain is doubtless a deposition of date subsequent to the landslip, and I have good reason to believe, was washed out of the Permian of the higher east country during the denudation. We have even very strong reason for the supposition that this great cliff sloped slightly from its base upwards towards the east, judging from the ascertained dip of the strata on both sides of the great crack, of which I shall speak more clearly presently, although at the top the sandstone fracture may have overhung.

On page 9 of "The Geology of the Country around Stockport Macclesfield, Congleton, and Leek," Professor A. H. Green says, "In the limeworks at Astbury the limestone is said to abut on the west against sandstone like that worked in Grotto Wood, and therefore Lower Keuper Sandstone; but it will not be safe to infer from this that the throw of the fault is here equal to the thickness of the missing formations, as the Carboniferous Rocks were upheaved and denuded before the deposition of the New Red Sandstone." This may have been so in some places, and doubtless was so; but here the Red Rock Fault seems to prove that the New Red Sandstone was already deposited and cemented, when the Cheshire Plain fell, or the Carboniferous Rocks were upheaved; for not only does the Lower Keuper Sandstone so abut against the limestone, but it abuts also elsewhere against the Yoredale Rocks, and against the Coal-measures; and it is impossible to conceive how the two should come sharply together in this crack with strata tilted almost conformably, unless they were formed prior to the occurrence of the crack. In fact the history which we are studying includes two denudations of these Carboniferous Rocks. First a denudation took place during the shallow submersion of the Carboniferous horizon, and after it had become a deep denuded sea bottom, it received the Permian and other strata of the New Red Sandstone. Then it slowly re-emerged from the sea and was re-denuded of its New Red Sandstone as it neared the boisterous surface; but while yet beneath the water the Red Rock Fault must have happened, the westward slipping down and the denudation of the east continuing, until the whole was rounded off as we see it now. This is proven by the patches of Permian which still survive the denudation of the east.

It is evident that *after* the western down-slip the whole cracked district gradually rose together from the denuding waters. Now it is important to note that, as shewn in a woodcut section on page 8 of the above-mentioned Memoir, the dip of the strata west of the crack is not only nearly conformable with the dip of the strata east of the crack, but is a little less near to the perpendicular, the slight difference being exactly what would be expected to result from the sinking away, or sliding down of the western strata. To make this clearer to the student, let him take a pack of cards and place them edge-ways on a table, slightly tilted from west to east, the west top of the pack leaning against a support. The edges, or south end, presented to the eye represent the section of the strata of the rocks under consideration, before the landslip took place. Let him then cause a portion of the pack to slip partly down from the others, and the incline of the strata of the down-slipped cards will be still further from the perpendicular than that of the strata of the cards east of the slip which remain at the original tilt. It is relatively precisely so with the strata east and west of this Red Rock Fault, more or less, wherever it has been examined. The eastern cards also represent the lower part of the cliff, which would be left reared as a titanic rampart overlooking the sunken plain or sea-bottom. But it must be remembered that the cards only represent the east country as it would be after considerable denudation, and to complete the illustration we must imagine the cards eastward of the slip continuing curvingly over the top of the support against which they now merely lean. Over the great uprising and upholding prop of Mountain Limestone we must curve, more or less, the Yoredale Rocks, upon those the Grits, upon those the Coal-measures, upon those the Permian—because even of the Permian we have some patches left on the east country shewing that it was there—and upon the Permian the New Red Sandstone, because there must have been that to correspond with the fracture which we find below. It appears certain that this great sinkage took place while the sea yet pressed upon that plain, and helped to tear it down from the firmly supported eastern country against which it was suspended, like the slope of a tent-roof. And Neptune no sooner found himself before this great rampart than he set to work to overthrow it, and by incessant assault at last crumbled it to ruin and rounded off the horizon as we see it now.

Now let me explain why I described this great rampart as black, and let us seek the reason why the great rent in the earth happened just where it did. I will turn to the cards again, but instead of letting them lie loosely sloping, I must have the strata which they represent cemented together, as was the case with the leaves of these rocks of New Red Sandstone and Coal-measures, before the great land-crack happened. For the section of these strata, as we find them now, turn again to page 8 of "The Geology of the Country round Stockport, Macclesfield, Congleton, and Leek," which shews the dip and nature of the rocks east and west of the fault, in the lane on the south-west side of Grotto Wood, before referred to. So I paste the cards together into a solid square pack ; except that in the middle of the pack I cause two of the surfaces to adhere temporarily by means of water only, instead of paste, to represent the weak place in the strata which permitted the slipping down of the country west of the fault. I then, as before, tilt the pack against a support, making it lean from west to east. The mass of cards, representing the strata, rests now, at the top east edge of the pack, against the eastern support ; and at the bottom east edge of the pack, upon the table ; the west bottom edge, and all the western half of the pack, being uplifted, and upheld over a hollow space, only by the adhesion of the surfaces of the cards one to another. We wait awhile until the weak adhesion of the two middle surfaces of the pack—by means of mere water—gives way, and the west half of the pack slips down. This is a miniature and imperfect illustration, and I must leave it to the judgment and imagination of the reader to correct and fill it up. The down-slip took place just in the middle of the pack because the adhesion there was weak, and unable to sustain the pending strain of the western portion. An examination of the strata east and west of the Red Rock Fault, wherever there is access to it, will shew that it was a corresponding weakness that caused the slip to take place just where it did. The strata of rocks, east and west of the crack, are generally hard and firmly cemented together, except just at the fault itself, which happens in a soft crumbling black shale. This is seen in the lane near Grotto Wood, above referred to ; at the brook section at Ford Sprink ; at the section between Astbury Lime Works and Congleton Edge ; at another in the River Dane near North Rode Viaduct ; at the west end of Ratcliff Wood ; at the Broad Oak

Reservoir; at the Poynton Collieries, and along the Mersey near Goyt Hall. There was evidently a hollow under what is now the Cheshire Plain—a hollow left there probably when the eastern country was lifted up, by whatever force beneath, and dragged up the western with it, over which hollow the land hung like the roof of a tent, and the rent therein ultimately took place along this exact line of the Red Rock Fault, because there the band was of rotten black shale, and the weakest of all the strata. And as we find the remains of this stratum of black shale always to the east of the crack, we may reasonably infer that the cliff above presented a black face to the setting sun, until the ocean washed it clean.

But now that has all been washed away, and the ruggedness of the scene has been rounded off by the battering waves of the sea, leaving only these reduced bulwarks stretching away eastward of the crack, north and south and beneath our feet.

Alderley Edge. Great Earthquake, and Great Floods.

But since this eastern country was denuded as it slowly rose up from the depths of the ocean, exposing its hills to the influence of the surfacial storms and tides; and since the edges of the great Red Rock Fault were levelled down, and the wide landscape around us was smoothed off as we behold it; but when the landscape of the west was a wild forest, and not a cultivated garden as now, and was roamed by the Bos Primigenius instead of his tame domestic descendants of to-day—there happened another catastrophe on this plain, similar to that of the great landslip which I have described, but on a very much smaller scale. A certain disturbance of the surface took place, which tilted over the meres or lakes in its neighbourhood, and sent their floods bounding over the surface of the plain like those of so many broken Sheffield Reservoirs; tearing up strong oaks by their roots, and all other trees that stood in their way; carrying the trunks prostrate into every hollow for miles away, wherever the waters at length found rest. There are thousands of these tree-trunks still remaining in groups spread over certain lower parts of the land, although thousands of them have been removed by the farmers, generation after generation, from fields which, being once mossy and marshy, have been reclaimed and drained and cultivated. These buried trees are a source of religious consolation to the pious

peasantry of this plain. They touchingly and triumphantly point to them as ocular evidences and vestiges of Noah's Deluge, with a faith that it would be cruel, if it were possible, to disturb.

Now, glancing over these regions with a geologic eye, to seek the centre of this disturbance and the source of this deluge, there is but one spot on which attention pauses. Nowhere else do we find evidence of a great earthquake, or land sinkage, of recent date—happening, that is to say, since the whole land was last upheaved from the waters, and therefore leaving the ruggedness of its fracture unobliterated by rounding aqueous action—nowhere do we find this tell-tale natural sharpness of fracture and cliff, although of a soft and yielding formation, on all the Cheshire Plain, but at Alderley Edge, looming up there to the north-west beyond Macclesfield. It has puzzled all geologists who have examined this plain, Professors Hull and Green among them, why the great and bold escarpment* at Alderley Edge has remained undenuded and unrounded, while every other feature of the plain is thoroughly water-worn and rounded off, even the south-western aspect of the Edge itself. But, then, these geologists have been thus puzzled to find one side of the hill a rough unworn fracture, and the other side completely water-worn and rounded off, because they have taken it for granted that Alderley Edge was first thrust up from the plain when that fracture was first exposed ; instead of which it is evident that below that north-eastern cliff the land broke away and sank from that side of the hill to the more general level of the plain, just as I have described the breaking away of the western country all along the great Red Rock Fault, and from the same cause. With that great down-slip of land, and the necessary displacement of meres or lakes, which would ensue within several miles of its neighbourhood, I associate the prostration of the forests on this plain.

The Drift Deposits.

I have now but a few words to say on the subject of the so-called Glacial Drift Deposits of this plain. I am not going into the general question of Glacial Drift, nor to speak of the drift which I have not examined, on lands which are unfamiliar to me. As to this plain, to

*I use the words "cliff" and "escarpment" indifferently, in wilful disregard of an attempt to give them distinct definitions.

the west before us, we should naturally look around us to the north, the east, and the south, and expect to find some of the detritus of denudation of these higher lands washed down to the plain below, when the country was gradually rising from the sea, and subjected to the battering of the storms and tides which denuded and rounded it. Even before examining the detritus on the plain we should expect that. And, when examining the detritus on the plain, we should, as reasonably, look towards the hills for its source, before resorting to the telescope of imagination to draw it from afar off. Patches of Permian in the northern and eastern country within this horizon shew themselves as mere planed remains of greater masses which have been swept away in the aqueous levelling-down process. In like manner the Bunter Pebble and Sandstone formations have left their broad patches, and their evidences also of Bunter denudation. So it is with the Grits, the Coal-measures, and the Mountain limestone. The débris of all these we find mingled in the plain, and the débris of nothing else except some reddish and yellowish flints, which are from the top, and only the very top, of the Upper Chalk formation, which existed farther eastward, and may have been stripped, and its top flints scattered westward on the top of the Bunter before the land assumed its present form of horizon ; or these flints may have been washed up from the sea from the north-west. I will not stop to explain now why the ferrous-stained flints are the very top layer. That would lead me to the subject of the Origin of Flints, which belongs to a separate paper. The so-called glacial boulders and pebbles of this plain resemble the boulders and pebbles of the Bunter Conglomerates as we see them *in situ* in Staffordshire ; and large patches of the remains of which formation we have here north, east, and south. They are much split and fractured, just as those of Staffordshire readily split and fracture when removed from their beds and subjected to the least violence, being already very much cracked *in situ*. The pock-marks, or marks of abrasive contact, which are peculiar to the Bunter stones, we should not expect to find after they had been drifted about and worn as the stones of this plain have been in their scattering. And we do not find those pock-marks on the stones of the plain except in rare instances. I found two large brown quartzites, each with one of these unmistakeable pock-marks extant, among a heap of large stones gathered from the boulder-drift

at Mr. Thos. Bibbey's sand-pit at Lawton Heath. These two boulders had somehow escaped the full share of wear to which their fellows had been subjected in being wave-driven on the surface of the plain. Now, if these boulders be derived from the broken up Bunter Conglomerate, we ought to find traces of the well-rounded sand of that formation ; and that we find readily enough. The great bulk of the fine grains of the so-called drift-sand of this plain shews under the microscope the angularity of the Millstone grit from which it is doubtless derived ; and twenty feet from the surface, at the above pit, the rounded grains are comparatively few. But towards the top, where the large stones and gravel abound, the rounded grains predominate, and are markedly distinct from the grit with which they are mixed ; for the grit is still apparent, blended with them, as might be expected, derived from the east country at the same time as the detritus of the Permian and Bunter. And that roundness has nothing to do with æolian action *in situ*. The round grains are beneath the large stones and gravel. In this Lawton sand-pit there is a fine section exposed, which I have frequently examined. The materials of the so-called Drift are abundant and deep in the Cheshire plain, because they had a longer time to accumulate in its deeper waters when it was sea-bottom, than on the higher lands which were then shallow and emerging, before the lowest surface was, in its turn, swept and levelled by the retiring force of tides and marine storms, and then uplifted beyond the range of their influence to this day. We have in the deep section of the Lawton pit, and everywhere else in such sections, a pretty clear record of the varying weather at the time of deposition. We have straight lines indicating that the sea bottom was smooth, because its waters were calm, merely depositing the results of tidal flow among these hills. Then we have irregular bedding, showing that the agitation at the surface of the waters was sufficient to extend to the sea bottom, and wash up the sand into a wavy surface. This was again planed down perfectly smooth when there was no more disturbance than the even to-and-fro of the tidal flow ; and we see in the sections exactly where the crests of the sand-waves have been planed off, leaving the lines of irregular bedding visible below suddenly terminated. And then there is again a distinct registration of halcyon days above, in the straight clean lines of deposition below ; and so on alternately. In the Lawton

section we have also, as elsewhere on this plain, a layer of angular fragments of coal about 25 feet below the surface. This is part of the detritus of the Coal-measures of the neighbourhood ; the clay of which, with the red marl of the same measures largely preponderant, helps to form the boulder-clay. In some patches this boulder-clay is so largely combined with finely pulverized felspar, that when exposed to the heat of the potters' china-biscuit oven it melts into true lava. It is precisely the same with some of the red marl of the Coal-measures now *in situ*. It may now reasonably be asked why such a formation, extending to a depth, in some parts, of nearly 300 feet, should be termed Drift? I have used the term only in obedience to custom, and objected to it the first moment I saw a section of this sand with its clays and gravel. It is no more Drift than the Triassic formation on which it rests.

True Drift is that surfacial jumble of clay, sand, and stones, which has not been assorted by the natural laws of gravity in aqueous deposition. It does not depend, for its character of Drift, upon any special mineralogy in its materials. But in its mineralogy, it is worthy of note, we shall find that it always takes very much of the character of the mineralogy of the country on which it rests.

Now the Bunter formation is remarkable for its numerous cracks and faults. It has been cracked *in situ* by earthquakes, and the fractures rubbed up and down against each other in so many places, that the wonder is there are not more of its stones scratched, and striated, and polished, than we find in this so-called Drift. As to the grooves in the very large stones, some of them are caused by this abrasion of surface against surface in a fault, in which a hard chert pebble operates, and a great many of them have been caused by nothing more than the trickling of water down their sides for ages as they stood *in situ*. The mere drainage of rain from the narrow top of a stone pillar of the hardest Millstone grit, will wear out grooves in the course of time—tear-furrows I have called them ; and anyone may satisfy himself of this by examining the Millstone rocks on the High Peak of Derbyshire, where there are thousands of instances of this rain-grooving. It was first pointed out to me by the Rev. Canon Greenwell and Mr. Jewitt. We were standing over an open barrow on Hart Hill Moor in the High Peak, out of which a great grooved slab of grit was lifted. I was speculating on the origin of the

grooves when both the Canon and Mr. Jewitt declared they were rain-gutters, and pointed to a rude stone monument close by called the "Nine Ladies" of Hart Hill Moor, and two great natural towers of Millstone grit called "Robin Hood's Stride" in each of which the grooves are strongly developed and are undoubtedly gutters worn by the rain flowing from the tops of those rocks. The people of the neighbourhood, generations ago, had noticed these grooves, but it never occurred to them, of course, to ascribe them to glacial action—they were not sufficiently learned—but they started a tradition that Robin Hood made them by grinding his arrow-heads upon that grit. Of course the grooves in the slab referred to had been worn in it in its original exposed situation, before it had been utilised by the Ancient British Undertaker as the cover of a kist. I have also seen in the Fairy Glen near Bettws-y-Coed a large flat slab in a slanting position, on to which water dropped from a rock above. The spot splashed with the dropping water was worn into a basin, and from that basin there extended a long straight groove made by the flow of those incessant drops over the slab during the course of ages, the whole bearing the appearance of the work of art rather than of natural accident. Grooves and striations in rocks have assisted much error in geological science. The presence of an erratic boulder on the top of a hill, needed not the stupendous portage of an iceberg. The existing hills were once parts of valleys, and may have received their boulder-burden when in that lowly condition. And the boulders that are regarded as foreign, may be mere Survivors of adjacent hills which exist as such no longer, as I have said of the granitic parents of the grit.

Now, of Drift, truly so-called, there is abundance on this plain, and among these hills—clay, sand, and stones, mingled together by the last action of the waves upon the land surface, when there was no longer any deep water for their separation by natural gravity into layers.

And there was once a great Drift-force in operation over all this land to which I will now draw brief attention. I need not say that the greatest might of the ocean operates at, and near, its surface. Its tidal force is greatest at its surface; and the force with which it breaks up rocks lies in its *Æolus*-driven billows. That surfacial force of the ocean would most powerfully operate upon the land when the

land was just rising to the surface of the sea, from the sovereignty of the ocean to the sovereignty of the air. The parting blows of its late ruler would be mightiest just before the final retreat. First it would assault the mountain tops as they were gradually reared up to the sea level, and break great fragments of them to roll them below. And as the mountains arose, stage by stage, as indicated in the terraces of the High Peak to the north-east yonder, and elsewhere, the power of the waves would drive the detritus together into the most sheltered spots, and the repeated operation of attack and retreat would produce the lateral and terminal moraines. It will be seen that this final force of a retiring ocean, sweeping over the land to and fro for awhile with its æolian and tidal violence, *must* have produced such a result as the blended Drift, just as we find it, whatever other agencies may have had power to do the same. Evidently, true Drift is the consequence of the arrestment of stratification in the final act of denudation. And this Drift force, so unlike the amazing theories which have been dragged from the regions of imagination, is but retrospect fact, which can never be eliminated from the history of the gradual emersion of the land from the sea. The superior force with which the billows would dash over the land from the north and west, with the full oceanic impetus of tide and storm, is registered in the steep escarpment of this and other mountains, while the more gentle back-flow of the waters accounts for the more gentle slopes to the south and east.

To return to the angular fragments of rock, large and small, strewn among the drift, they are nothing whatever but the materials of the eternal daily work of the ocean, commenced upon and left unfinished, for the reason which I have already stated. The great Bunter stores are the materials of the very same kind of eternal daily work of the ocean, commenced upon in exactly the same manner as this drift, but finished off in Triassic seas, or great rivers, and laid down in sorted layers.

Now as to the shells found in the drift-sand of this plain. Much has been made of the circumstance that they include Arctic specimens. Yet the famous fragments found in the Macclesfield Drift really include none but such as have their habitat within the British seas. The *Cyprina Islandica*, *Astarte arctica*, *Astarte elliptica*, and *Trophon clathratum*, may be termed arctic species, but their southern

limit extends to the British seas. It is true that some shells which were said by some workmen to have been found in the Drift were rejected as spurious: those specimens however were not Arctic but tropical. Had the attempt been to palm off Arctic specimens it might have succeeded, especially had they included the *Pecten Islandicus*. But there is no reason why this solitary shell should not be found in the Drift, somewhere within the British Islands, without afflicting these regions with glacial congealment; even if it has not at present its habitat in British seas. The ocean is mighty to punish resistance, but, how tender it can be in its treatment of its own fragile shells all know who are familiar with a sandy beach, even after the uproar of a great tempest. The same force which will tear down rocks in their resistance, will land with marvellous gentleness, and push far inshore without the slightest injury, the most beautiful fragile pearl houses of its fauna, which even the delicate touch of a girl will crumble. Even the wonderfully constructed little crystal palaces of the *Annellidae tubicola* are thus moved far along by the waves without injury, and there is no reason why so strong a shell as the Comb-shell of Iceland, should not reach us from the Arctic regions without bringing the Arctic regions with it.

If it be asked how it happens that drift sometimes covers such a site as the Cromer Forest Bed, I must reply that I do not know; not having seen that drift nor that country. It is unsafe to theorize without personal examination of a subject, where personal examination is possible. That Forest Bed is on the sea coast, and after it had become a flourishing forest, it may have subsided sufficiently to admit the waves of the sea upon it with their mud and sand. And, even inland, such a thing might reasonably happen that boulder-drift should be removed by floods and redeposited on lands which had supported both recent flora and fauna.

It has been thought that the existence of boulder-clay is largely due to the grinding action of ice upon the mountains. I have already stated that it is impossible to produce true clay—and boulder-clay is true clay—by any power of attrition. The Divine Compounder of the rocks had fixed a law, operating silently, invisibly, and mysteriously, for providing His creature man with clay, at the same time that He ordained for him coal and ironstone, all three materials essential to the fulfilment of man's destiny and the exercise of his genius; and

never commissioned deathly glaciers and floating ice-bergs to create and disperse the great plastic deposits of this plain and these hills.

I now come to the last division of my paper :

ON THE DEPOSITION OF THE FLORA OF THE CARBONIFEROUS PERIOD
IN THE COAL-MEASURES.

CE now turn our backs upon the plain, and look again towards the north, east, and south country, where the Coal-measures repose in their basins of Millstone grit. As I have already said, this mountain on which we stand is but a piece of the broken rim of the Biddulph coal basin—Congleton Edge, and Mow Cop, being continuations of that rim. How transformed is the scene since the period when this great basin was a Carboniferous lake ! It is quite certain that where the coal and its measures now lie, there they were originally deposited ; and I shall shew that within the watershed which supplied these great basins of Millstone grit with their deposits, the original magnificent flora once flourished. Yet, however changed be the scene, the transformation from the ultra-tropical Carboniferous landscape to this Moorland view is not so extreme as the transformation from the primitive granitic view which preceded the submersion and washing of the grit, with all its silent desolation and ruggedness and universal death, to this happy Vale Royal behind us which has at length succeeded it.

It was only after the granitic rocks had yielded their clay and their sand for a soil of growth, and their varied solutions, added to that of the limestone, for the nourishment of floral life, that vegetation became possible : but when thus possible it appears to have sprung into an enormously strong and prolific vitality, which lasted for a period, until its divinely ordained purpose was accomplished, and has never since been repeated in the earth's history.

Let us, however, first describe and examine the theories which at present divide the attention and credence of scientists, respecting the deposition of these Coal-measures and their coal, before attempting to shed our further feeble light upon the subject. And in so doing it will happen, as it is always happening, that we shall find placed before us certain facts, which, having been made stepping stones towards

paths of error, will be equally available in helping us in the direction of truth.

"There are," says Professor Hull, in his work entitled "The Coal Fields of Great Britain," "at least two theories, each having its advocates, to account for the formation of coal: the first, which would assign its origin to the drifting of vegetable matter by rivers and floods into estuaries and shallow seas, where, becoming water-logged, it formed a bed or stratum along the bottom, and was entombed by the overspread of sediment; the second, which refers its origin to the growths of successive forests in the positions, and over the areas now occupied by the seams of coal themselves." Professor Hull then observes in a foot-note, "the arguments and difficulties on both sides of the question are fairly stated by Mr. Jukes in his "Memoir of the South Staffordshire Coal-field. Second Edition." To that Memoir we now turn, and we find that Mr. Jukes supports the River-and-estuary theory—at the same time that he proclaims his neutrality. For he says, speaking of the *Growth-in-situ* theory: "there are certain difficulties in the way of the latter, which, in spite of all the evidence as to the roots and upright stems of trees (or whatever the plants called *Sigillaria*, *Stigmaria*, etc., may have been), would make me hesitate to embrace it exclusively." He proceeds with several arguments, all strengthening the supposition that coal was formed under water, but none of which proved clear and strong enough to influence the judgment of Professor Hull in that direction. There is, indeed, much truth in Professor Juke's arguments against the *Growth-in-situ* theory, but nothing at all helping to establish the rival opinion. That he entirely held the latter, although he says, "I by no means intend to range myself among the advocates of either one or the other opinion," is clear from this statement: "More recent examination of the sand patches in the thick coal of the Causeway Green Colliery, and accounts of similar occurrences in many other parts of the neighbourhood, and the ending of the Thick coal in beds of sandstone in various directions, have only confirmed me in my belief in the entirely subaqueous deposition of those coals. The way in which thick and thin seams of sandstone and coal alternated occasionally with little seams of perfectly bright pure coal in the regularly stratified sandstone, while thick beds of pure bright coal are often flaked by little partings of clean sand throughout their thickness over con-

siderable areas, seems to me to render it impossible to suppose otherwise than that their deposition and stratification were produced by the same agent. It seems to me absolutely necessary to suppose that the vegetable matter was strewed out in regular thin laminæ at the bottom of some water, and that occasionally little clouds of fine sand or silt were carried into that water, and likewise sank to the bottom in fine layers. I have no doubt of the process of accumulation being a very slow and gradual one, for I have long been accustomed to look upon the time required for the formation of any widespread bed of stratified rock whatever, even a single foot in thickness, as one to be measured only by the lapse of scores of years, perhaps by that of centuries. Each bed of coal is certainly made up of thin laminæ, which are obviously laminæ of deposition, every tenth or every hundredth of an inch requiring a distinct period for its production, as in the case of all other laminated rocks. The variations that place in the quality and character of coals, sometimes inch by inch in their different laminæ, one being less and another more earthy, etc., the separation of the laminæ by little films of shale, or by thicker 'partings' of substances that are distinctly argillaceous earth, more or less mingled with carbonaceous matter, those partings occasionally thickening out into substantial beds, and the occasional occurrence of nearly pure quartzose or micaceous sand, sometimes quite free from carbonaceous admixture, either in the thinnest films or in thicker beds, will all then be naturally accounted for by one process, namely, the gradual deposition of laminæ and strata of different kinds of substances, with different degrees of mingling at the bottom of some water." Further on, Professor Jukes says : "In no Coal-measures that I ever examined in any part of the world, either in the British Islands, Newfoundland, or Australia, could I ever detect anything but the most perfect conformity and blending between beds of coal and the stratified aqueous rocks in which they lay, the whole apparently forming one series of deposits produced by one agent acting in one way."

Thus Professor Jukes was evidently convinced, from his extensive experience and observation, that the coalfields and coal-measures were everywhere deposited in water ; but he fails satisfactorily to explain how. Nay, his attempts at explanation weaken and discredit his case. He speaks of the deposition of coal as if it were not a

fugitive substance, but were inorganic matter like the shales and sandstones, and its lamination due to the slow deposition of fine particles "every tenth or every hundredth of an inch requiring a distinct period for its production, as in the case of all other laminated rocks." This is against all fact and reason. The lamination of coal is only partial, and is not to be accounted for by the deposition of fine matter like that of the shales, and that deposition an intermittent process dividing the production of even one hundredth part of an inch. The partial lamination of coal is chiefly attributable to the nature of the vegetation which composed it—flat foliage and prostrate hollow trunks of the *sigillaria*, *calamite*, *lepidodendron*, etc., which under pressure would flatten into such imperfect laminæ as we find in coal. And it is important to remember that a slow deposition of vegetable matter in water, especially in a warm climate like that of the Carboniferous period could have resulted in no accumulation whatever, as it must, inevitably, have decomposed and been gaseously dissipated. Any theory which requires a very long period for the accumulation of vegetable matter will prove false. And I say this in full mindfulness of the deep bogs of Ireland and elsewhere, being aware that those bogs are not the result of vegetable growth *in situ*, but basins and troughs of vegetable matter which has been swept into them from adjacent woods when they were basins and troughs of water, or empty hollows. It is no contradiction to this statement that bogs are found on table-lands in Ireland, nor even that they are found on the sides of hills. As it is unnatural for a soft aqueous mass to form and accumulate on the smooth slope of a hill, it is clear that such bogs were formed before those hills were uplifted, or else they have been washed down from the table-land above.

We will now return to Professor Hull, who, having studied Mr. Jukes' arguments in favour of the Aqueous-deposition theory, rejects it in favour of the Growth-*in-situ* theory; saying : "Without denying the probability that some exceptional beds of coal have been accumulated by drifting, and believing that drifted plants and stems of trees are of frequent occurrence in the sandstones and other strata of the Coal-measures, yet the second theory—that of the growth of plants *in situ*—appears so much superior to the former in explaining the complicated phenomena which present themselves, that I feel constrained to adopt it here."

The chief reason for this preference by Professor Hull, and the great majority of geologists, lies in the discovery initiated by Sir William Logan forty years ago, that nearly every clay-bed, on which nearly every coal seam rests, is penetrated by the rootlets of *Stigmaria*. *Stigmaria* is proven to be the root of *Sigillaria*, and *Sigillaria* is proven to be the chief constituent of coal, *ergo*, it is said, the marl on which the coal immediately rests, and which is penetrated with rootlets of the flora which composed the coal, was the soil on which the flora grew, *in situ*. Or as Professor Hull says : "This observation of Sir W. Logan established the hypothesis that the plants of which coal is formed grew upon the spot where we now find them mineralized, and that the under clays formed the soil from whence they sprung." This hypothesis I shall, nevertheless, attack.

The coalfields being great basins or troughs, and the lowest of the coal seams deposited therein being in some instances so deep as 10,000 feet from the present surface, with stratum upon stratum of coal and intervening marls and sandstones built above them to the entire filling up of the basin or trough, a difficulty arises to the imagination as to how such immense thicknesses of vegetation could ever have flourished *in situ* at the bottom of such tremendous hollows, and, further, how it could happen in such cases that these great basins and troughs of the earth should refuse to be lakes and seas, according to the law and nature of things terrestrial, and aquatic, and persist in remaining deep valleys of verdure, flourishing as such uninterruptedly for ages—for 30,000 years to wit ! To remove this difficulty Professor Hull suggests a theory which I will mention. There was, before that, an Up-and-down theory. The marl and sandstone strata of the Coal-measures being indisputably aqueously deposited, it was supposed that the basin, after a deposition, was lifted up into the form of a shallow plate, or flattened up and dried, and that vegetation flourished therein for thousands of years. It was then let down again and submerged for another deposition of sand and marl, and then raised, and dried, and planted again, and so on fifty times or more, according to the number of coal seams piled one above another. No wonder that Professor Hull finds it difficult to adopt this Up-and-down theory. He tries to improve upon it, and says : " Let us suppose that a certain bed of coal has been completed by the growth of luxuriant plants over a low-lying tract subject to

inundations from the sea. Rising ground of granitic or schistose rocks in the distance defines the margin of the basin and the boundaries of a continent from which the sedimentary materials of the coal strata are derived. That growth of vegetation marks a period of rest; but now a slow subsidence of the whole tract commences. The brackish waters of the estuary, and the salt waters from the ocean invade the jungle, carrying dark mud in suspension, with floating stems of trees and fronds of ferns. Presently the mud subsides, and covers in one uniform sheet the accumulated vegetation of centuries. The process of subsidence goes on, while the sea currents and rivers pour into the estuary fine sand and mud, in which branches and stems of trees from the uplands are included. This process continues until the sinking of the ocean bed either altogether ceases or is counterbalanced by the rapidity with which the sediment is deposited. The basin becomes gradually shallower, and the plants begin to reappear, commencing perhaps at the coast, and creeping seaward until the whole basin is again overspread by a forest of huge cryptogamic trees, arborescent ferns, and conifers, with a dense undergrowth of giant grasses. These, generation after generation, flourish and die, their leaves, branches, and trunks falling around and gradually accumulating till the pulpy mass attains a thickness of 20, 50, or 100 feet. The process concluded, the basin again commences to subside, the waters return and bury the mass for thousands of centuries; stratum after stratum accumulates, till the vegetable pulp is subjected to the pressure of, it may be, thousands of feet of solid matter. Meanwhile, chemical as well as mechanical changes ensue, and in process of time what was once a forest is changed into a bed of coal. By a repetition of this process, with local variations, we may conceive the formation of any number of coal-seams, amounting—in some districts—to 50 or 60, and embraced within a vertical thickness of several thousand feet of shales, clays, and sandstones."

Professor Hull adopts Mr. Maclaren's reasoning to shew that it would require a thousand years to form a bed of coal one yard thick, and that, consequently, the South Wales Coal seams, which are, altogether, more than thirty yards thick, took a period of 30,000 years for their vegetable formation alone. Professor Hull also, following Sir Charles Lyell, and adopting a medium between two extreme estimates, calculates that this entire coalfield, in all its strata,

took 3,807,000 years for its production. This period of 30,000 years, let alone the 3,807,000, is something rather heavy for the imagination to digest in connection with so fugitive a matter as that of exposed vegetables ; and it would be quite a relief to suppose that, instead of the open growth *in situ* resulting in the production of a foot of coal per thousand years, the warm and moist climate of the Carboniferous period dissipated and dissolved its dead and decaying vegetation at a rate in proportion to the rate of the new growth *in situ*, after the soil was once fully planted. And this must have been inevitable, owing to exposure to the combined influences of air, heat, electricity, and water. There are certain conditions necessary to life and increase in the vegetable as in the animal world ; and if the Sigillariæ, and all the flora of that period, loved, as they doubtless did, the sand and blue marl for their soil, it is not reasonable to suppose that they could equally well flourish in a pulpy, purely vegetable bog "of a thickness of 20, 50, or 100 feet." Nor would it have been possible for the comparatively slight stigmarian root of the Sigillaria—a majestic tree towering 60 or 70 feet—to have supported so gigantic a trunk, on or in a foundation of such rottenness. If the coal seams represent vegetable matter of the Carboniferous period grown *in situ* in the hollows of the earth only, what has become of all the other growth of that period on the level plains, the table lands, and the mountain slopes ? If it could accumulate for 3,000 years in the open, might it not accumulate for 30,000 ?

Yes, we are told that it took 30,000 years for the accumulation of the coal only of the South Wales coalfield ; but that it took 3,807,000 to accumulate the measures and coal together of that basin. Now, if during the brief period of 30,000 years coal seams have accumulated to 30 yards in thickness, and some of the single seams, in their exposed growth and decay, had gradually accumulated to 100 feet in thickness of a pulpy mass, before submersion and covering up, would it not be almost as likely that the vegetation in some parts of the globe should have gone on increasing without the interruption of the deposition of the marls and sands, and have become mountains of carbon ? If the vegetation of the coal period could go on increasing with its short lateral roots fixed in, and feeding upon, a foundation of its own dead fifty feet in depth, and so thrivingly, too, as ultimately to add another fifty feet to the mass, why should it not, in some in-

stances, have gone on increasing in the same way to the depth of a thousand feet during a fragment of that 3,807,000 years? The rule of the forest, however, is that the more rapid the growth the more rapid shall be the decay after death, the same causes operating both ways. It is only a small matter to observe that if "the brackish waters of the estuary, and the salt waters from the ocean," had been the depositing media, as described above, their evaporation would have left deposits of salt in the formation. There is potass in the coal, but it is only the natural proportion of potass carried, more or less, in all vegetable matter, and taken up from the soil during growth. Also, it is difficult to conceive the luxuriant growth of purely terrestrial vegetation in a salt marsh. It remains a puzzle to the supporters of the *Growth-in-situ* theory, how that particular soil—the blue marls or fire-clays—which the *Sigillaria* and its floral contemporaries loved so well, should have been so uniformly deposited and redeposited above the buried woods, for the new growths of new coal seams. I will presently try to show how it came there. Then, as to Professor Hull's idea of "a slow subsidence of the whole tract"—just the tract bearing this mass of vegetation and its intervening measures, and not beyond the edges thereof, and that subsidence always taking the form of a deepening basin or trough, reason altogether rejects in any single instance. But what shall we say of the theory of this remarkable subsidence happening uniformly in different parts of the globe, wherever coal is found? And so uniformly intermittently, too, on those particular spots where the foundation rocks happen to be the firmest of all that compose the earth's outer crust—Millstone grit and Mountain limestone. Granite and all felspathic rocks are less firm because they melt with subterranean heat, and hence they give way and form volcanic vents. The strongest foundation, as I have said, of the *Growth-in-situ* theory is the fact that *Stigmariae*, or their rootlets, are almost universally found in the marls underlying the Coal seam. Yet this fact, when properly examined, so far from proving a foundation, proves the destruction of the theory. If the *Stigmariae* had been found uniformly crowded in these marls, disturbing by their growth the original even bedding of the strata, but themselves undisturbed, and their rootlets attached, as, indeed, they would have been found if grown *in situ*, then they would have proved incontestable witnesses. But the reverse of all this is the case. What is found in

the floor of the coal seams is detached and fragmentary rootlets of the roots ; only sometimes the roots themselves with or without their rootlets ; and instead of disturbing the laminæ of the stratification by their expansive growth, they shew evidence that they sank when that marl itself sank, and were buried during its stratification. Is it possible that a mass of rotten vegetation 100 feet thick, formed, indeed, "over a low-lying tract," yet not sufficiently low to be even flooded during that growth of terrestrial plants—is it possible that it should be invaded by the sea without being washed out of that shallow, and spread abroad by the rushing waters ? Instead of thus taking the water and its mud to cover the forest, we must take the forest and its mud to the water by means of water. There is no need for an ingenious Up-and-down-theory, nor for an equally ingenious, but equally insufficient, Down-and-down theory. Why should we seek to drag from the regions of imagination, oppressive theories—stupendous improbabilities demanding stupendous faith—when we have but to seek in a natural and simple manner the solution of the problem of the deposition of coal, to find a natural and simple elucidation ! As to the River-and-Estuary theory, that is as untenable as the Up-and-down, and the Down-and-down theories. There is no repose in an estuary to render possible the deposition of such thicknesses of the pure light vegetation as formed coal, and are found in coal basins. Estuarial deposits are necessarily of a more miscellaneous mineral character than are contained in the coal basins, and the deposits of estuaries do not form basins, but raised Deltas. If a seam of coal a yard thick took a thousand years to form in an estuary, or even to grow *in situ* on a delta often overflowed, how could it possibly happen that the matters of deposition, also and ever, by the same ever-moving waters, all sorts of mud, and sand, and stones, were not also deposited, and so mingled with the vegetable matter, as entirely to prevent the formation of clean coal ? Let us reduce the thousand years to a thousand days, and the same difficulty remains in the River-and-estuary-and-delta theory. If all these theories leave a great hiatus in their consistency, we had better let them go. Professor Jukes, in spite of his declared conviction, based upon great experience and observation, that the coal was aqueously deposited, as well as its measures, found so much difficulty in digesting the River-and-estuary theory, that he abandoned his said conviction, yielding, however, to

the illogic of theories no sounder than that which he rejected.

We find the coalfields of the earth everywhere in the forms of basins or troughs, which have indeed been terribly cracked and shattered by violent earthquakes, since they received their first deposit of coal; but shewing, by the stratification of their edges and sides, and the condition of their contents, no reason to lead us to suppose that they were anything else but troughs and basins when they received their first deposit of coal-matter. That is to say, the shattered pieces of these basins with their contents, like the fragments of an earthen bowl, bear in themselves abundant proof that they were basins and not plates. Such vast hollows of the earth could not be other than great freshwater lakes or seas—freshwater because we find no salt in them, and freshwater because there was no salt in the composition of their grit formation. Look at a geological map of Coal-measures and Millstone grit, and Mountain limestone, and note the faults indicated thereon. The map looks as crackled as a thoroughly well crazed piece of rotten pottery. But one-tenth part of the cracks of the earth are not marked. The maps are very lenient of the faults of the Coal-measures and their predecessors, because it is only by accident that those faults come to light, in certain places, and every new excavation adds to our knowledge of faults. What are those faults or cracks but indisputable evidences of the frequent earthquakes to which the crust of the earth was subjected in the earlier days of the earth's history? Every crack indicates an upheaval or a subsidence at some period, resulting in very many instances in enormous displacements of the strata, and changes of the surface of the land in every direction. We know that the Carboniferous period was a period of exceptionally gigantic and abundant vegetation, the result of great warmth, and abundance of moisture and of carbonic acid gas, which latter lies now solidified in coal, as an evidence of its previous gaseous condition. Some of the upheavals would naturally tilt over basins or meres of water, larger or less, as I have described in connection with the subsidence north of Alderley Edge, and these waters rushing over the surface of the land would tear up and bear before them the forests of *Sigillariæ*, *Calamites*, *Lepidodendra*, and all that we find in coal, carrying with them the roots and rootlets, and the soil in which they grew. This frightened and freighted torrent would seek its way to the most come-at-able

neighbour of a lake—the basin or trough of our coal-field—and there with its burden would take calm refuge. Soon after reaching the margin of the basin the coarser and heavier matter would begin to subside, and the finer farther on, as I described in regard to the Bovey clay-streams. The deposit would be finer every yard nearer to the centre or to the lee-ward side of the lake, until only a very fine cloud of mud remained in suspension, just as far as the current had reached in the hitherto still waters. In such a trough as that now containing the South Staffordshire Coal-measures, nearly thirty miles in length, the force of the torrent, with its cloud of fine mud in suspension, would not reach the centre of the lake, and did not, as Mr. Jukes has shewn in his diagram, where the sandstones and shales, which are thick towards the edge of the basin, taper off and die out towards the centre, about five miles away, while the coal deposit continues forward after the shales have ceased. The great mass of floating vegetation would drift and spread over the whole surface of the lake at its greater floating leisure; but in fewer hours than the years which have been assigned to its formation, the whole mass of that floating forest-ruin would sink to the bottom, and each repetition of the catastrophe within the watershed of that lake would spread upon that lake bottom an amount of vegetable matter, with its intervening strata of soil, which ultimately became pressed and crystallized into a seam of coal, each from two to three feet in thickness. These seams are each parted by their tapering shales and sandstones—their original soil washed down with the vegetation—except in the centre of the lake, where the mud forming the shales has not reached, and there, where the floating vegetable matter *has* reached, the coal seams extend, one upon another, and form that thick mass of ten yards, called the “Thick Coal.” The first part of this drifted mass to sink, with the mud itself, would be some of the free roots and severed rootlets of the *Sigillariæ*, because they would be already charged with water in their official relation to the living tree. Some of the trees themselves that had not been severed from their roots, and had escaped entanglement in the mass of floating wreckage, would naturally be drawn down in a perpendicular position by their water-logged roots, assisted by the greater weight of the base of their taper forms, especially when their hollowness was filled up with sand. Had the *Stigmariæ* which are sometimes found in the

marl below the coal grown there *in situ*, they must always have borne evidence of such growth, instead of which they distinctly contradict it, by being mixed up fragmentarily, and in complete disorder, among a clay preserving sharp and clear its own lamination of deposition ; while crowded rootage in its expansive growth entirely obliterates the even lamination of a soil.

It is not possible that the Carboniferous period could have had its rivers flowing in old established channels into the same estuaries for thousands of years. Its landscapes, from the records it has left of itself, were rugged and precipitous, with great and small deep lakes, cascades, and intermittent floods and torrents ; so often was its horizon altered by upheavals and subsidences, and the repose and flow of its waters interrupted and diverted.

The argument that coal was deposited in salt water, because its measures contain fossils of fishes whose habitat was possibly salt water, is, of course, worth nothing. All the fauna of the true Coal-measures were such as were certainly quite at home in fresh water, although it was possible to naturalise some of their kindred to the salt also. Fossils found in strata spread above the Coal-measures after the re-submersion of the land have nothing to do with the question.

The ripple which is sometimes found on sandstones of the Coal-measures, and which Professor Hull quotes to prove the prevalence of currents, proves nothing but that the spot so rippled was probably a margin of the coal-lake, or a shallow part of it at the time it became rippled ; or it might even have been a very deep part and have become so rippled during the periods of sudden inflow.

The strongest argument which Sir Charles Lyell uses in favour of the Growth-*in-situ* theory is contained in the following, in his "Students' Elements" : " It has been remarked, that if, instead of working in the dark, the miner was accustomed to remove the upper covering of rock from each seam of coal, and to expose to the day the soils on which ancient forests grew, the evidence of their former growth would be obvious. Thus, in South Staffordshire, a seam of coal was laid bare in the year 1844, in what is called an open work at Parkfield Colliery, near Wolverhampton. In the space of about a quarter of an acre the stumps of no less than seventy-three trees with their roots attached appeared, as shown in the annexed plan, some of

them more than 8 feet in circumference. The trunks, broken off close to the root, were lying prostrate in every direction, often crossing each other. One of them measured 15, another 30 feet in length, and others less. They were invariably flattened to the thickness of one or two inches, and converted into coal. Their roots formed part of a stratum of coal 10 inches thick, which rested on a layer of clay 2 inches thick, below which was a second forest resting on a 2-foot seam of coal."

In reply to this I would answer that the miner cannot be said to work exactly in the dark; certainly the results of his mining are brought into the light of day, and examined by the fiercest lights of science; and, too often, by the delusive lights of imagination. This fossil forest, which, being near the surface, it was possible to lay bare, and of which Sir Charles gives a ground-plan in illustration of the *Growth-in-situ* theory, unfortunately proves the reverse of what he wished. "Their roots formed part of a stratum of coal 10 inches thick," of *coal*, not clay; and the whole seam "rested on a layer of clay 2 inches thick." Can anybody argue for a moment that a forest of trees, some of them 30 feet in height, flourished in a soil 2 inches deep? Besides, the roots were in the coal, not in the clay. The deposition of the coal was in a very shallow place—the top of the basin, when it was so nearly filled up that its hollow was no longer that of a basin, but a plate. It was a feeble flood, comparatively, that brought down that vegetation, for it only deposited 2 inches of clay, and 10 inches of coal. Evidently the clay sank down first, then the roots which would be the heaviest of the vegetation, and the soonest water-logged, because they contained most water at the start; and they sank in a natural attitude because heaviest and broadest at the bottom; and they sank on to the clay floor and not into it, for they "formed part of a stratum of coal 10 inches thick."

Before concluding, I ought to briefly refer to the circumstance which Professor Hull describes as "the most inexplicable phenomenon in connection with the subject," namely, the occurrence of coal in the Arctic regions, right away towards the North Pole. I have had occasion before to refer to the once tropical fauna of the present Arctic regions in a question relative to primitive man, and in the second chapter of "*Arbor Low*" are these words, "And it is possible that there was once another traversable route to America besides

that of the Atlantic. I have long held that the earth did not always revolve upon an axis at the same angle to the sun's rays as at present. The now frozen north was once torrid, and may have furnished to wandering tribes an easy way to the American continent. Siberia and the Arctic regions were once warm fruitful regions, supporting a population of huge elephants, whose habitat was such a clime as that of India is to-day. The separate discoveries by Gabriel Sarytschew and Ossip Schumachoff of entire bodies of the Mammoth, un mutilated and uncorrupted, imbedded in solid masses of ice, indicate that the change of temperature in the instance of their calamity was sudden. They were overwhelmed with a flood, which froze into a solid mass around them before a bone had been broken, or their flesh had become tainted ; and when disentombed thousands of years later, their flesh was then sound food for dogs." These are evidences of a sudden glacial period, which has, however, remained a glacial period to this day.

It is not reasonable to argue that the mammoth of those regions was an Arctic animal. The abundance of ivory scattered throughout the Siberian cemetery favours the idea that the mammoth population was large ; and for the support of such monsters, those regions must have yielded an abundant and constant flora for their food. Perpetual warmth and perpetual moisture could alone render possible the exuberant and gigantic flora which supplied the coalfields, and which must have continued to flourish in new species later on to feed the mammoth and his fellow creatures at that time and place.

And, now that my subject draws to a close, I trust I have shewn that the flora of the Carboniferous period was stripped and uprooted from the forest land by great floods, put in motion by land disturbances such as that which happened at Alderley Edge ; and that the mass was carried into great lakes just as the sunken trees on the plain here would have been carried, had there been a great lake for their reception. But the land being very flat the uprooted forest trees were strewn about in the swampy places, and lie to this day near the surface. Had there been a great lake for their reception, these trees would have been in a fair way to have formed a considerable coal seam. And yet they never could have become coal, even then, if nothing more had happened to them than has happened yet. Up to this very day an important part of the process would have

been wanting. Vegetable matter cannot become coal unless it be not only stored up, but thoroughly well sealed up. Another such flood, bearing clay, must succeed the sinking of the vegetation, to deposit a lid upon it, and shut down its otherwise fugitive elements. In the coal period the successive floods each brought their new burden of vegetation, and the lid to cover up the last deposit, at the same time.

CONCLUSION.

Now, in all these ancient operations of Nature, at which we have briefly glanced, we catch glimpses and revelations—revelations made by the tongues that are in stones—of the mysteries and the grandeur of the Divine Plan formed when the Spirit first moved upon the face of the waters. These revelations of the stones are unique ; we can learn them from no other source whatever ; and they are infallibly true if we will but take the trouble to learn their language accurately. Wanting this careful study, we are apt to be led into guessing bogs of inconsistency and ridiculous error. These immense deposits of carbon were solidified from an atmosphere which contained the whole of the same in the form of carbonic acid gas. And, mark ! that does not mean only the presence of so much more carbonic acid gas in the pre-Carboniferous atmosphere, than in that which we now breathe ; but it means the absence from that pre-Carboniferous atmosphere, in a free condition, of all that enormous store of oxygen gas which held the carbon gaseous. Here we catch another glimpse of the Creator's Plan in this seeming waste. The creation of this Flora was the great chemical process by which the carbon should be separated, and the oxygen at the same time liberated to form an atmosphere which should be the breath of Life of beings about to be created. By means of the Promethean discovery, man, without knowing it, is the agent in fulfilling another important part of the Plan, by *gradually* again liberating this carbon as carbonic gas, to supply the ever-increasing demand for carbon through the medium of vegetable food, to the ever-increasing animal organizations of the earth. In every new glimpse of the Plan of Creation which it is the happy lot of the naturalist to find out, and to publish to his fellow men, Man, above all the other possessors of the earth in all epochs, finds most cause

for gratitude and adoration. I have already glanced at the Design evident in the original pounding of the hypozoic rocks, and their general distribution in granitic form. Every subsequent earthquake which broke and re-broke the levelled surfaces into crags, exposing them again and again to the mighty strokes of the eternal daily work of the ocean, to batter and pound and re-level, was part of that same work of blending, so essential to the future life of varied flora. And then came the luxuriant Carboniferous period, so rich in a very limited floral family, but with no fauna, to speak of, to consume or utilize it. It seemed to have burst forth prematurely and wastefully : to be wasted indeed, by being thus torn up in its prime, season after season, and washed away, and buried. The Genii, or Angels, of the Air, passing over and looking down upon this state of things, might have whispered together that the Lord of Creation surely slept while His works were wasted, and His Plan was suspended. And so indeed it seemed of that period ; even until Man the Inheritor appeared upon the scene in due time, and in due time became matured in his knowledge and skill. Then it became clear to the heavenly intelligences, as it is now gradually revealing itself to the intelligence of man, that the Plan of Creation of which he catches glimpses now and then, through the researches of the naturalist, was a plan of uniform progressive beneficence in favour of many orders and races of beings ; but that this special work of the Carboniferous period—the deposition of these strata of coal, clay, and ironstone, which fill the grit basins before us among these hills, was an express provision in favour of man only, for the exercise of his peculiar genius, and the fulfilment of his peculiar destiny, in conjunction with his control of Promethean Fire.

CLOUD HILL.

PART II.

A PAPER

READ AT THE SEVENTEENTH ANNUAL MEETING OF
THE NORTH STAFFORDSHIRE NATURALISTS' FIELD CLUB
AND ARCHAEOLOGICAL SOCIETY, HELD AT STOKE-ON-TRENT

MARCH 22, 1882.

ON THE TEMPERATURE OF THE CARBONIFEROUS PERIOD ;
ON THE CHEMISTRY OF THE AIR AT THE SAME TIME ;
ON THE COAL BASINS AND TROUGHES ;
ON MARINE AND OTHER COAL SEAMS ;
ON THE TESTIMONY OF THE ROCKS ;
AND ON THE STIGMARIAN ROOTS OF THE SIGILLARIA.

REPRINTED

FROM "THE STAFFORDSHIRE SENTINEL" OF MARCH 25, 1882.

CLOUD HILL.

PART THE SECOND

THE TEMPERATURE OF THE CARBONIFEROUS PERIOD.

It is not possible that all the geologist has to say about the splendid panorama viewed from the summit of Cloud Hill could be condensed between the covers of a brief pamphlet. If he has carefully examined the rocks of that scene, and would faithfully and fully translate their testimonies, he must write an ample volume. Therefore, the "Cloud Hill" pamphlet, written hurriedly, and with tied-to-time despatch for the Cloud Hill excursion, is necessarily a mere sketch, with very much room left for the enlargement and emphasis of its arguments. But if its arguments were hurriedly expressed, they were by no means hurriedly conceived, and the wide attention which they have met, and the critical examination to which they have been subjected by many geologists, render their further amplification and emphasis at length desirable.

In giving, as I have given, the results of my own careful examination and study of mountains, valleys, and strata, I was fully aware that wherever these results were in opposition to orthodox theories, they were liable to the most violent opposition of the orthodox. But, as I write my scientific convictions careless of applause, so, when it is my duty to write, and it became my duty so to do in leading the Cloud Hill excursion—I write fearless of opposition. And this opposition to innovation, carried to a certain reasonable extent, is right and laudable. It is akin to the conservatism which prompts us to follow and reverence the religion of our fathers. But for all that the obstinate defence of untenable tenets amounts to bigotry as much in science as in religion.

He who offers mere baseless opinions in such a science as geology, deserves little thanks, however great his name ; and he who offers new facts, or facts in a new and truer light, with evidences and logical deductions, deserves as little the hostility of his confreres, although he is sure to catch it.

Let me give an instance of scientific bigotry by alluding, for the third time, to the Siberian mammoth. Since I spoke of it as necessarily the inhabitant only of lands of perennial verdure and perpetual warmth and moisture, a learned professor has written a paper in which he repeats the orthodox statement that this huge herbivorous animal "showed its adaptability to withstand cold climates." It is even on record that the Siberian mammoth was naturally furnished with bristles for the purpose of shaking off the masses of snow which must accumulate upon his back during the Arctic winter. Now, what would the great hungry Jumbo benefit by being thus furnished with the power to relieve its exterior of its burden of imaginary snow, if left entirely unfurnished with the means of relieving its interior with a burden of real vegetable food ? He would require daily a supply of from 150lb. to 200lb. of vegetable food, and how would he be able to obtain a single green twig during all that Arctic winter in all that wilderness of snow ? In the same northern lands where the mammoth flourished in multitudes as its bones attest, and must have flourished on abundant green food daily all the year round, as the nature of its species, its herbivorous habit and huge bulk attest, there are also found seams of coal deposited geologic ages before the advent of the mammoth ; but under the same skies, and composed of vegetation which none would have hesitated to declare tropical, but for one circumstance. And that one circumstance is this : Certain theorists wish to maintain that coal was created and deposited very slowly, and during a very prolonged period of time for every foot of thickness ; and as that could not happen in a tropical climate, where the heat would rapidly turn all the dead vegetable matter into gases, and prevent accumulation, therefore, this vegetation must have flourished, and these mammoths also must have flourished, under circumstances which have no parallel in anything known to us in nature. Now, in the examination of all such matters, I choose the natural, and reject the unnatural. Or, if I cannot discover a natural way of accounting for a thing in natural

science, I leave it alone as being out of my reach for want of sufficient knowledge, and refuse to theorize.

Now, although the vegetation which composed coal so largely consists of *sigillariæ* and *calamites*—enormous bamboos and reed trees, yet we are desired to believe that the climate of the Falkland Islands is a fair sample of the Carboniferous climate. It is thought that in such a moderate climate as that coal might accumulate at the rate required by some theorists, of one yard per 1,000 years, or, at the rate required by other theorists, of one yard per 4,600 years and to a thickness of 100 feet of exposed coal matter. I have never been to the Falkland Islands, nor read about them in any book; but I have both corresponded and conversed with people who have resided there for many years. It was in my early childhood and within my recollection that the first Governor went out with the first group of settlers to those islands. It had been reported to be a good sheep-grazing locality, and the new settlers called at Buenos Ayres, and bought there several hundreds of sheep, which they located in one of the islands. But during the first winter those sheep were nearly all lost in a great fall of snow which reached to a mean depth of about six feet. The place has been described to me also as being comparatively without trees, and dotted only with small bushes, and almost constantly swept by a stiff sea-breeze. That does not sound very Carboniferous. I do not know whether suitable trees have since been planted and now flourish there, but I do know that it produces nothing to entitle it to comparison with the period of the abundant and magnificent forest growth of the Carboniferous period and climate. Yet it has certainly, since its first settlement, become a considerable carboniferous locality, and is even a very convenient coaling station for her Majesty's ships when in those seas. But the coals have been carried there from Newcastle. The temperature of the Falkland Islands has been described to me by the inhabitants as averaging something like that of the English March—cooler in summer, and milder in winter than the British seasons, and therefore it is selected by the Growth-*in-situ* theorists as more suitable for the prolongation of the decay of dead vegetation, and representative of the Carboniferous climate. But fancy the majestic *sigillariæ* and the colossal *calamitic* bamboos flourishing in such a region.

All we know of the nature of the Carboniferous flora indicates

that it was of rapid growth, and it needed warmth and moisture and abundance of carbonic acid gas for that growth. As I have already said, the rule of the forest is that the more rapid the growth the more rapid is the decay after death, the same causes operating both ways. I now add that the inverse is equally true, the slower the decay after death, the slower the growth in life. It has been suggested that if the Carboniferous temperature had been tropical, we ought to find the remains of more varieties of flowering plants than are met with in coal. This increase of varieties, however, belongs to the question of the development of more complex and advanced floral life in later times, and not to a question of mere temperature in the early days of the creation of the earth's flora.

The cause of the comparatively even, cool, temperature of the Falkland Islands is their smallness, whereby their breezes are all sea-breezes. The Carboniferous period was not a period of specially small islands and universal sea-breezes; but a period of continents also, which, unless tropical, would be subject to much greater extremes between winter and summer than are small islands.

And, besides the tropical appearance of the flora of this period, the yield of its seas, left in abundance in its limestones, all points to a hot climate, namely the lamelliferous corals, crinoidea, and large chambered cephalopoda. The dogmatism of this assertion respecting the Carboniferous climate, unsupported as it is by a vestige of evidence, and in opposition as it is to the positive floral and marine evidences which are so abundant, appears to me unworthy of science, and is indeed akin to religious bigotry. And it is all invented merely that decaying vegetation shall theoretically abstain from natural gaseous dissipation, and shall bear exposure to the fermenting influences of electricity, temperature, air, and water, for 1000 years per yard of solid coal, or, as others demand, for a period of 4,600 years per yard of solid coal.

Now, if instead of selecting two small cold barren islands in the South Atlantic as climatic representatives of the splendidly luxuriant floral age and lands of which we are speaking—that era in the world's past, which we emphatically call its Carboniferous Era—if, instead, we looked direct northward from those small islands to the basin of the Amazon, and onward still to fertile Yucatan and Mexico, we should see that there the warmth and moisture, so necessary for

exuberant vegetation, are still producing the rich and vigorous forest-growth, which is the only worthy, but more advanced and varied, succession to the grand primitive forest-growth, of which coal is formed. But dogmatic theorists will theoretically starve even a floral era to bend it to their purposes.

THE CHEMISTRY OF THE AIR OF THE CARBONIFEROUS PERIOD.

ROM the temperature of the Carboniferous atmosphere let us pass to its chemistry. I spoke of the pre-Carboniferous atmosphere as being charged heavily with carbonic acid, which the flora of the Carboniferous period subsequently solidified into carbon, so rendering the later atmosphere fit for the breath of life of beings about to be created. The pre-Carboniferous atmosphere means the atmosphere of the primitive earth, before its rocks were decomposed into a fruitful soil, and that soil became fruitful. It was the atmosphere which preceded the appearance of flora in any great abundance ; the atmosphere, which prevailed before solid carbon prevailed on its created surface, except in the form of diamonds, and as part of carbonates. The commencement of the true and literal Carboniferous period reaches further back than some geologists at present imagine. Of this I am writing in another work, and will pass it by in this place. It is said, in reply to my statement, that the air-breathers of the coal period could not have existed in such an atmosphere. They did not exist in it ; but they existed later on in the atmosphere which I said was being prepared for them by the chemistry of the forests, when vegetation flourished, and had long flourished. Had the critics been possessed of a little more biological, meteorological, and chemical knowledge, they would have found indisputable my statement that "these immense deposits of carbon were solidified from an atmosphere which contained the whole of the same in the form of carbonic acid gas," and I should have been saved the trouble of writing a new paragraph on the subject of carbonic acid. Plants do not eat solid carbon like animals, as a rule, but absorb it in a state of gaseous or liquid acid. The atmosphere which was breathed by the so-called amphibians, and the myriapods,

and land snails of the coal period, which succeeded the old red sandstone, had been already immensely relieved of its carbonic acid, as I have shewn in another work, but the process was continuous and progressive, and even that atmosphere would have been poison to warm-blooded mammals and birds. But the fauna of the Carboniferous period were not warm-blooded. Those who deny the possibility of animal existence in an atmosphere containing more carbonic acid than that which we now breathe are not only biologically ill-informed, but they strangely lose sight of that marvellous adaptation of creatures to the places, conditions, and times assigned to them, which we see everywhere in operation.

And this adaptation of which I speak is not a gradual self-adaptation, as some philosophers wish us to believe. In vain would the first butterfly have burst from its tomb to the resurrection of the glorious summer, had there been no floral chalices of food provided for it, and adapted to the support of its life. And in vain would the floral chalices of nectar have been provided for it, had the lovely thing been unendowed with its dipping proboscis so peculiarly adapted to its purpose of sipping up its food from the recesses of the blossoms.

If it be true that the camel possesses an extra water-viscus for its reserve supply in the thirsty desert, I should also say that the first camel, when he started from his first oasis and found himself thirsty on his long journey, must have been already provided with his water stomach and his water reserve, or must have died, and his race with him, before accomplishing self-adaptation to the circumstances.

And we now learn that the *Testudo Gigantea*, the great tortoise of the Californian desert, is actually provided with a couple of water bags, or loose linings, to the interior of its carapace, containing a store of about a quart of pure water, derived from the *Cactus* leaves on which it feeds, and provided as a reserve for the use of the tardy traveller in his journeys from one *Cactus* oasis to another. This provision, also, was necessary to the first journey in the desert of the first of his kind.

And we see this forecasted adaptation everywhere around us. Self-adaptation to circumstances, whether of the butterfly on the rim of his nectar cup, the camel in the Sahara, or the tortoise in the Californian desert—in all animated nature, to be left to self-

adaptation—would mean, left to perish!

So we may rest satisfied that the air-breathers of the coal period were adapted to the atmosphere in which they lived, although that atmosphere differed from ours. But even they did not live in the true pre-Carboniferous atmosphere, which was a foodless period of death and desolation. Judging from existing reptiles, their blood was cold and pale, and of slow circulation, and their breathing feeble, consuming comparatively little oxygen. We may safely say this because the reptiles even of our own time, acclimatized as they are to an extra-oxygenized atmosphere, do not assimilate the extra oxygen, and can exist in air so deficient of that gas that what little blood they possess shall lose nearly all redness, yet the animal shall not die.

If our knowledge of life had been limited to land-life, we should have declared it impossible for any animal to live in water. And if our knowledge of aquatic life had been limited to fresh-water life, we should have declared it impossible for any fish to live in salt-water. It is no more wonderful that a breathing organization should be adapted to a Carboniferous atmosphere, and extract sufficient oxygen therefrom, than that it should be adapted to aqueous, and especially to salt-water life, and extract sufficient oxygen therefrom, without assimilating or being affected by other matters in solution. The life which I spoke of as about to be created while the extra carbonic acid was being gradually solidified into coal, was reptile life. And it was that reptile life which went on increasing and developing so wonderfully, right into the Oolitic Era of Reptiles, as the coal accumulated and the air became daily more oxygenized, but was yet unfit for warm-blooded creatures. And the coal still accumulated, and the air continued to change, right through not only the Carboniferous period, but through and beyond the era of reptiles until it became sufficiently oxygenized for the highest class of warm-blooded mammals and birds which have long inherited the world of the Saurians.

Now, I feel that I can afford to be generous, and will offer an argument against myself which is a much better-looking one than the error which I have just discussed, and it is one that we can examine with profit. It has been calculated that the whole weight of the atmospheric envelope of this globe is nearly fifty-four millions of hundreds of millions of tons, and that it extends to a height of more than forty-five miles, and that its normal proportion of carbonic acid

gas is one-thousandth of the whole. It is estimated that the carbonic acid gas added to the atmosphere by the respiration of the whole human race during twenty years would only amount to a millionth part of the whole, and that it would bear proportion to the entire oxygen alone of one unit to two hundred thousand. It would therefore take twenty thousand years for the present population of the globe to double the present normal quantity of carbonic acid gas in the atmosphere, which would still be harmless.

Thus it is clearly demonstrated by figures that we are independent of the eternal work of the vegetable kingdom, so busy in its rectification of the animal exhalations contained in the atmosphere. Arithmetic will do the work instead. Now, if somebody will only take the trouble to reckon up all the coal and all the carbon that is in and on the face of the earth in the same manner that this human breath has been estimated, weighed, and reckoned up, and will expand it all into carbonic acid and set it free, he will still leave a theoretically wholesome atmosphere, and the accident of suffocation need not be apprehended by even the most highly-organized warm-blooded animal.

And now what becomes of all I have said about pre-Carboniferous and Carboniferous carbonic acid gas? Still I shall stand to my gun; and it is the figures of millions of hundreds of millions of tons which will have to give way. Yet I do not question the accuracy of these figures. Nevertheless they are not worth the paper on which they have been elaborated; because the carbonic acid, instead of being equally diffused through the whole volume of the atmosphere of forty-five miles in height, is concentrated and almost confined to its lower regions, where its true economical sphere lies. It is most dense at the immediate surface of the earth, and is only slightly dissolved higher up a small fragment of the distance of forty-five miles. It is so sensible to a reduction of temperature that it cannot exist in the cold rarified regions. The law of diffusion which keeps the two constituent gases of the air—oxygen and nitrogen—blended together in certain proportions, although their gravities differ, does not carry carbonic acid gas into the uppermost regions. And the concentration at the earth's surface of the gas producible from the existing coal seams, and from the combustion of existing vegetation and animals—that is a return to a pre-Carboniferous atmosphere, would produce, if

not immediate suffocation, certainly narcosis and death to any who might be left to test the result. The two gases, oxygen and nitrogen, may be everywhere equally diffused in the proportions by weight of eight to twenty-eight, and in bulk of one to four, because they are each simple gases, and keep this molecular company by some law of attraction under all changes of natural temperature and pressure. They expand together and contract together equally as one body, although they are not chemically united into one compound. But it is not so with carbonic acid gas, which is not a simple gas, but a compound of vaporous carbon with oxygen, chemically united. Its expansion and contraction are not uniform with atmospheric air under the same conditions of temperature and pressure. It is readily expanded upwards by heat, its expansiveness thereby being more than four times that of air. Its sensitiveness to cold is, of course, in the same ratio, and it is condensed into an invisible fluid at a very moderate temperature. Its behaviour is more analagous to that of water than of air. Water is expanded into the air as a temporary vapour by heat, and is diffused upwards to a certain limited height. But beyond that very limited height it cannot ascend, from the same cause which operates with carbonic acid ; for beyond a very limited height the atmosphere is frigid, and watery vapour, if it could ascend there at all, which it cannot, would become solid frost and immediately descend again. So carbonic acid gas, if it could possibly be carried forty-five miles high, and if it should prove as cold there as it is calculated to be, would part company with its 16 parts by weight of oxygen, to which it was originally wedded by warmth, and the 6 remaining parts of carbon out of the 22, would become as solid as it is in the limestone rocks, by losing its latent heat, first of gaseousness, then of liquation. But then it would possibly retain its transparency in assuming solidity, and descend upon the earth in a shower of real diamonds, as the aqueous vapour, in its sudden condensation, descends from lower regions in showers of crystalline hail. For diamond is but carbonic vapour reduced to carbonic crystal ; or, at least, diamond may be expanded to carbonic vapour, and, in combination with oxygen, become carbonic acid gas. But the carbonic acid gas does not reach that height to be thus precipitated in showers of diamonds, and so the precious carbonic gems continue scarce. I know that traces of carbonic acid gas have been

found three miles from the surface of the sea, on the summit of Mont Blanc. The wind might force it up the mountain slopes from below even higher than that, or it may even be naturally diffused that high when the local temperature is at the highest. In warmer latitudes it certainly reaches two thousand feet higher still, and affords scanty nourishment to the lichens of the Himalayas at the height of 18,225 feet ; but beyond that I believe even lichens do not exist, and that height is but a small fragment of the forty-five miles. So far as human experiment is concerned, carbonic acid gas will be found wherever man can penetrate to seek it. If he could penetrate to the congealing uppermost regions, and could experiment there for twenty-four hours, he would breathe forth from his own lips enough of this gas to produce a shower of diamonds from 9oz. to 12oz. in weight—a shower of gems like words from the mouth of an orator.

The effect of carbonic acid gas upon warm-blooded animals is to produce drowsiness, and its absence in the air breathed permits extra hilarity. The deficiency of this gas in the air of the mountains compared to that of the plains is one of the reasons why we ascend the former with a sensation of increasing liveliness and vigour. The upper air, on account of its comparative rarity, contains less oxygen per volume than the lower air. But Providence intended that the mountains, to a certain extent, should be habitable as well as the plains, and, therefore, compensated this deficiency of breathing matter by ordaining the growth upon the hills of such flora as should yield a compensating amount of oxygen in the form of ozone. It is from the resinous flora of the mountains that the ozone of the upper air is breathed forth ; and it flows down the mountain sides during the calm, as regularly as it is forced up the same slopes and over its summit during the prevalence of winds. And thus the air from the heathery hill is bracing even to the dweller at its base.

But the presence of ozone is not the only cause of exhilaration to the mountain climber, nor even that and the decrease of atmospheric pressure combined. There is another cause which operates even when the mountain rock is barren, and that is the comparative deficiency of carbonic acid gas, which permits the oxygen to do its work more effectually, even although each inspiration contains actually less of that gas of life than the denser air below. The order in nature is so wonderfully exact, that wherever we examine with proper know-

ledge and judgment, we find everything normally in its right and best place. There is no use for the carbonic plant-food in the uppermost regions, and it is not there. This is all I have to say at present about carbonic acid gas, and its prevalence in the early days of the earth's flora, and its gradual decline during the long Carboniferous period, and later still.

COAL BASINS OR TROUGHS.



E come now to the consideration of the coalfields, which I have spoken of as the contents of basins or troughs. It is denied that these sites were basins or troughs when they received the coal-measures, and Sir Charles Lyell is quoted. There are numerous coal seams in the world which are not coalfields, and such coal seams have been formed in a variety of ways, some of which I will presently refer to. But the coalfields are composed of a series of seams of coal lying one above another, and alternant with layers of shales, fire-clays, sandstones, and often ironstones ; and these deposits are invariably found in basins or troughs, or in shattered fragments of such depressions.

We are all aware that Sir Charles Lyell, with the *Growth-in-situ* theory fixed in his mind, found it necessary to imagine that hundreds of millions of years ago these basins were not basins, and that the depressions as we find them have been crumpled into basins and troughs, after they were filled with their sedimentary contents ! The question, however, is not what any man thinks these coalfields may have been hundreds of millions of years ago, but what evidence do they afford in themselves now as to their original condition. They are now basins and troughs, or fragments of such, and I will strengthen my own statement with the evidence of those towards whom the critics stand forth in the honourable character of champions.

Sir Charles Lyell acknowledges that "the Carboniferous strata most productive of workable coal have so often a basin-shaped arrangement." Professor Jukes says : "It seems to me absolutely necessary to suppose that the vegetable matter was strewed out in regular thin laminæ at the bottom of some water, and that occasion-

ally little clouds of fine sand or silt were carried into that water, and likewise sank to the bottom in fine layers." Now, there must have been some depression to hold this water. Also speaking of these coal-measures, he says, all will "then be naturally accounted for by one process, namely, the gradual deposition of laminæ and strata of different kinds of substances, with different degrees of mingling at the bottom of some water." The bottom of some water must have been the bottom of some depression. And he further says, "In no coal-measures that I ever examined in any part of the world, either in the British Islands, Newfoundland, or Australia, could I ever detect anything but the most perfect conformity and blending between beds of coal and the stratified aqueous rocks in which they lay, the whole apparently forming one series of deposits produced by one agent, acting in one way." Thus Professor Jukes most emphatically pronounces the coal-measures sedimentary, and if sedimentary they must have had something to settle in.

Professor Hull, in his "Coalfields of Great Britain," p. 52, describes the great coalfield of South Wales as in general form "that of an oval basin or trough." Again, on p. 62, speaking of the Bristol and Somersetshire coalfield, he says: "The northern part of this coalfield forms a trough lying north and south . . . the beds rise at high angles along the edge of the basin." Then, on p. 66, he says of the Forest of Dean coalfield, "It forms a more perfect 'basin' than any other coalfield in England, as the strata everywhere dip from the margin towards the centre, except at one part of the western side, where the oval outline is interrupted for a short distance."

Of course these basins and troughs are all broken vessels, and some of them are completely crushed up by volcanic convulsions. That the coalfields are basins or troughs, or fragments of such, is really beyond all question, and the surmise, merely to suit a theory, that they were ever level ground, hundreds of millions of years ago, is wild and unsupportable, and worth nothing at all. Sir Charles Lyell himself, although advocating a *Growth-in-situ* theory for the origin of coal, speaks of these deposits in the twenty-third chapter of his "Elements" as "the sedimentary beds, usually called the coal-measures." If they were sedimentary they must have been deposited in water; and the extreme fineness of the shales, which are composed of very fine mud, shews that it must have been still water when that

settlement took place; and if still water, it must have rested in a depression of the earth, or in a basin or a trough. The millstone grit, mountain limestone, and other strata which lie beneath the coalfields were crumpled into synclinal and anticlinal curves before the coal-measures were deposited in the synclinal hollows. An examination of the maps and sections of coalfields and the tapering and thinning out of the deposits proves this.

The cause of that original crumpling of the Carboniferous rocks has not escaped my research, and in some future work I may speak on that subject, but at present I will only say that the lateral pressure—and it was lateral pressure—which produced the synclinal and anticlinal curves of the country, viewed from Cloud Hill, was applied to strata which at that time were of a soft yielding composition, and were not cemented into hard rock as they are now, neither the mountain limestone nor the grits. Since their induration they have been again subjected to violent pressure from the same direction, and from every direction, but the effect has been different, resulting in angular fractures, and they have been broken and shattered very much by a thousand earthquakes, as they themselves bear witness. It was these synclinal hollows which received “the sedimentary beds, usually called the coal-measures.”

And how could these deposits be made in any other way than in hollows or basins? The waters would not be likely to run up hill to deposit thereon their charges of mud and sand. And if they ran through level valleys open at the ends, they could not deposit their *fine* thin mud there during their passage. The strata-materials must have been derived from higher lands around, and, if so, the coalfields must have been, in relation thereto, lower—therefore depressions, therefore basins or troughs. In the South Wales coalfield these layers are estimated to be piled one upon another to a depth of from 12,000 to 15,000 feet. How could they possibly be deposited in anything but a basin or trough? Professor Hull sees the difficulty, although he does not confess it, for he theorizes a moveable basin or trough capable of sinking deeper and deeper at certain intervals. To suppose first a level, and then a gradual and limited sinkage of these particular patches, within the bounds of the rims of these basins which happen to contain the coal and coal-measures in their bosoms, is to suppose an unnecessary miracle.

But the process could not even be started on a level. There must have been a basin to begin with.

The sinkage of the sea-bottom in certain places, as evidenced by the retiring coral formations, has nothing to do with the question. I have myself had occasion to write other evidences of such sinkage than this of the corals, which coral argument everybody may read about in school books. Such sinkages operate over vast tracks of strata which, while they sink in one direction, sometimes rise in the opposite, like the movement of a plank upon a central fulcrum. There are also basin-like depressions made in the earth by the sinking in of volcanoes when the weight above has become too great for the hollow dome beneath. There are basin-like depressions also of loose sand strata in the new red sandstone, through the dissolution and disappearance from beneath of great masses of salt. But, as I have stated in the first part of "Cloud Hill," the foundation-rocks of the coal-measures happen to be the firmest of all that compose the earth's crust—millstone grit and mountain limestone resting upon sandstone. Granite and all felspathic and micaceous rocks are less firm, because they melt with subterranean heat, and hence they give way and form volcanic vents. Whole tracts of millstone grit and mountain limestone, with the Old Red, or the Silurian, beneath them, and the granite also, rise and sink bodily; but the slow sinkage, or local limited sinkage, of the mere patches bearing the coal strata, in the forms of basins, during or after the deposition of the coal strata, will be seen to be physically impossible when we examine the foundations on which they rest. These foundations were liable to, and were subjected to, sudden crashes which broke, and upheaved, and depressed them into every possible angle; but the formation into basins by special slow, and measured, and local subsidences, after the contents had been deposited therein, is too absurd a theory to last—a miracle needless in nature, and necessary only for the support of a wild conjecture.

Sir Charles Lyell refers to the sudden manner in which, in the Lancashire and Yorkshire coalfields, the strata are cut off in their outcrop or uplifted edges, and supposes that the same seams and measures may originally have been continuous over anticlinals through the several fields, only that the upper continuity over the anticlinals has been worn and broken away by denudation. This is

quite possible, and, could it be proved so to be, would only prove that the depressions which we now know as the Lancashire and Yorkshire coalfields, are but minor depressions in the bottom of one greater depression, or basin, or trough, which had enclosed the whole, the chief outer rim of which had been eroded and carried away before the deposition of the Permian. Of such an erosion of coal and coal-measures I pointed out evidence of later date in the so-called Drift of the Cheshire plain, in which, 25ft. below the surface, I found a layer of angular fragments of coal; and the same has been found in other parts of the plain, and appears to be spread through the whole, and was evidently derived from the partial denudation of the neighbouring coal-measures.

MARINE AND OTHER COAL SEAMS.



LET us speak now of coal seams which do not belong to coalfields, and are not found in deep basins, and have been formed in several ways. We have most ancient evidence that some coal seams were formed in the sea-bottom. At Kilnaleck, in county Cavan, there is, or was, an extensive seam of good clear anthracite of thickness varying from twelve inches to twelve feet, pressed between the familiar Silurian strata of alternant slate and grit. Those black and grey deposits of Silurian age were unquestionably deposits brought down by some great continental river from primitive lands to a calm sea-bottom, and there is only one reasonable way of accounting for that clean deposit of coal between those marine strata. The same great river which brought down those deposits of black clay and grey grit, must have brought down floating upon its bosom the concentrated ruin of a vast forest. In a short time the water would press into the tissues of the wood, expelling the air, and the whole mass would sink uniformly to the sea-bottom. This water-logging and sinkage of floating vegetation may be witnessed on a small scale any autumn in the twigs and leaves cast upon the surface of a pond. Then, it will be asked, Why object to the River-and-Estuary-and-Delta theory when you are here exemplifying a Silurian deposit of that kind? This deposit is not in a shallow estuary, where, lingering at the surface, and stranding at

low tide, it must have been mixed up with estuarial deposits of sand, and could not have remained thick pure coal. Such masses of vegetation as this which sank at Kilnaleck could not accidentally, yet uniformly, drop just one above another, as in the coal basins, and this remains an isolated seam only. There may be thousands of seams of this kind between marine strata, scattered wide apart, yet floated down from the same watershed by the same river. The varying force and direction of the wind, in conjunction with the tides, and river current, would carry and deposit such floatage in various and far apart directions. Such exceptional deposits have nothing to do with the coalfields within ken of Cloud Hill.

Other coal seams have been formed by the sudden flooding and overflow of forests on their own native low-lying soil. The force of the flood has not been sufficient to sweep away the wreck which it has made of the reed-like growth, consequently it has not removed the soil nor the roots, and there they remain *in situ*, true witnesses of the Growth-*in-situ* of the dirty seam of coal above them which has been shut down by a cover of mud or sand, and subsequently further buried from atmospheric influence until it has become coal, but too dirty to be good workable coal. It is therefore that Sir Charles Lyell has to characterize the strata of the "basin-shaped arrangement," as productive of workable coal, in distinction to these flat isolated seams which are grown *in situ* and are dirty. Here then is an instance of Growth-*in-situ*, but it is a coal seam and not a coalfield, and has nothing to do with the coal basins south, east, and north of Cloud Hill.

It is in such home-grown seams as these that the spores of the Sporangia may be found reasonably enough. But the spore and Sporangia question is too open and doubtful a question to be brought forward in evidence of anything. Professor Huxley was merely "inclined to believe" that English coal was largely composed of these bodies, and we know very well that it is not, but is composed chiefly of a noble vegetation of large growth. Sir Charles Lyell differed from Professor Huxley, and says that Principal Dawson, in a careful examination of eighty-one coal seams, could only recognise the bodies, "called by him Sporangites," in sixteen seams, and of these only four had "the rounded Lycopodiaceous spore-cases similar to those of Flemingites." Lyell says that Dawson maintains "that

Sporangite beds are exceptional among coals." And Lyell accepts the conclusions of Dawson, although Huxley's would have been more convenient for Sir Charles Lyell's coal theories. Here is no bigotry, but a fair statement by Sir Charles of facts which are opposed to his own theories, or, at any rate, reduce their apparent strength.

And it is part of the true greatness of such men as Lyell, Hull, Jukes, and other great pioneers of geological science that, whatever their own private theories and prejudices may have been, they have recorded facts undistorted, as they found them, so far as they deal with facts, and these become precious materials ready to hand for the use of those who succeed them in their labours. As I have said before, the stepping-stones which these pioneers have laid down are of that firm character that, with continued labour, they will lead us on to truth, even although they may have also been employed to lead us to speculative error. It was so with the grand old experimenters who, while they believed in the transmutation of metals, and laboriously sought the solution of the golden arcanum, made discoveries so important, and so faithfully preserved the facts which they had discovered, that the splendid science of chemistry was the ultimate result. They laboured on generation after generation, with false theories in their heads, but the result of their wrong-headed labours was nevertheless magnificent truth.

Now there are other coal seams which are channelled with the marks of running water, and some have hastily concluded that therefore all coal was formed among running water. That would have been impossible, as I have already shewn ; because the fine matter of the coal-measures could not have been deposited in running water. Such seams as these must have been deposited in still waters, in incipient coal basins, but the ground was afterwards disturbed, and its settled waters drained off, channelling and furrowing the pool bottom in its drainage. Then there are Carboniferous strata in which the *stigmariæ*, or roots of *sigillariae*, are found imbedded with their rootlets complete, evidently in the situation of their original growth, with the trunks snapped off and gone altogether, and no trace of a coal seam left, although the rootage of the forest is there. This also tells its tale very clearly. The forest has been swept away by the flood, but the flood had not sufficient force and continuance to sweep away at the same time the soil and the rootage.

LET THE ROCKS ALONE BEAR WITNESS.—THE TESTIMONY OF THE ROCKS.



Now let me emphasize my description of the origin of the coalfields, and see whether it is really only conjectural, or if it be not rather demonstrated by the testimony of the rocks. Let the rocks alone bear witness. They attest that land disturbances were numerous in the Carboniferous days, and before, and since. The faults or cracks which we find everywhere in the earth, accompanied with the varied tilting and contortions of the strata leave this beyond dispute. The unmistakeable and indelible marks of these disturbances are engraven and welded in the very ground on which we now stand. I shall bring together these land disturbances, and contemporaneous lakes of water, some large, some small, and at every elevation, and the luxuriant contemporaneous forests, and let them fight it out, and merely watch the result. I know there are some sensitive geologists who seem to dread the mention of earthquakes even in the so distant past as the ages of which we are now speaking. They seem to put their fingers in their ears to shut out the noise, and to close their eyes to shut out the havoc, and then declare that there were no earthquakes to speak of. Others, who may not be so sensitive, but are credulous, become their disciples.

Thus a learned and distinguished geologist, not very long ago, when addressing a meeting, declared that the varying contours of the earth's surface were not due to volcanic and other subterranean upheavals and earthquakes, but to the rain, rivers, the sea, the air, frost, glaciers, and icebergs, heat and cold, springs and brooks; and quoting Mr. Croll, he said: "As Mr. Croll states, 'the valleys were not produced by violent dislocations, nor the hills by sudden upheavals, but were actually carved out of the solid rock, silently and gently, by these agencies.'" This is most surprising teaching, and sounds like a joke. What spring ever lifted up Cader Idris or Snowdon—to say nothing about the Himalayas—above the mean level of the earth's surface? That they were lifted up the sections of their tilted strata prove; and the learned and distinguished geologist, in adopting this amazing statement, leaves no uplifting force to do this mighty work, but a simple spring of water. For he denies that

the hills were produced by sudden upheavals, and adopts the teaching that the causes which formed "the varying contour shapes of the earth's surface must not be supposed to be in volcanic and other subterraneous upheavals or in earthquakes." As to the valleys, it may be said that the valleys are there because the rivers are there, and the rivers have helped to scoop out the valleys. But it may still more wisely be said that the rivers are there because the valleys are there; for the very earliest river-courses must have been in the very earliest valleys, as rivers do not naturally run up hills. If the strata of the earth could be deprived of their past earthquakes, the vocabulary of geology must be deprived of the word "unconformability," and then what would become of our classifications of "geological periods?" But the science will not lose that important word, and the word itself will, in its truth, be sufficient evidence of the earthquakes of the past and of subterranean upheavals. All the agencies quoted from another writer by the learned and distinguished geologist do indeed their silent and effectual work; but instead of doing work more marked than did the subterranean forces of the past, in carving the features of the earth's surface more boldly, they are and ever were employed in scraping down and rounding off the more marked and bold and rugged features created by the subterranean forces of the past.

Not only have the land disturbances of the Carboniferous period left their own abundant records, but they have left the records of a far greater number of land disturbances in the surrounding neighbourhood of the coal basins than there are seams of coal deposited therein. So there was no scarcity of repetition of force for the purpose.

Now these three things being co-existent, namely, land disturbances, lakes of water—for we have evidence that it rained in those days—and forests of vegetation, what must have been their inevitable effect one upon another? The tilting up of the strata which we find, or change in the level of the land, must have tilted over the lakes, whose waters sweeping through the forest must have broken down the reed-like trees, and carried them in their course, generally washing away the soil and roots also when the torrent was sufficiently strong. This is the testimony of the numerous faults or fractures, and changes of level of millstone grit and mountain limestone, which was the base of the Carboniferous soil. The testimony of the coal

basins is quite consistent, and shews the sequel. There we find in a sedimentary form, as admitted by everybody, the soil which the Carboniferous flora loved so well, mixed with the broken rootage of the forest, and above this lies the prostrate forest-ruin clearly separated from the mud and sand of that torrent, which overthrew the forest and brought down vegetable and mineral matter in one confused mass. We should have had no fossil fishes of the period but for this sudden flood of mud into the lake, by which they were overwhelmed and blinded, and carried down and buried. For it is not the nature of fishes to die, and sink, and find graves in the mud. Some of the great hollow *sigillaria* stems would naturally get filled with the unassorted mud and sand and broken vegetation in this pell-mell passage, as they were carried along among such material, and when the whole reached the lowest land, or lake-basin, for which it must naturally make its way, these earth-filled tree-stems would sink at once, broadest and heaviest end downwards, some with their roots, attached, some without. So with the broken-off roots or *stigmariæ*. They being already water-logged in their natural relation to the tree, as the furnishers of its sap, would sink at once, or very soon, some with part of their rootlets attached, some stripped of them. Then the mud would gradually settle down around and upon them, while the great mass of vegetation still floated on the surface of the waters and spread out there. I have shewn, and need not repeat my arguments, that neither by the operation of the *Growth-in-situ* theory, nor the River-and-Estuary, or Drift theory, could we possibly obtain the thick seams of pure coal which are found in the coal basins. Foreign mineral matter must have got generally mixed up with the vegetation, to the extent which we do not find, during any slow accumulation of a thousand years per yard. If coal took a thousand years per yard to produce by growth and decay in its native swamp, we must suppose a thousand years of perfect calm for every yard of clean coal, during which thousand years the waters of the swamp never once became muddy, and no fierce winds blew to scatter over the swamp the dust of the higher lands. But even that unlikely condition of things would be insufficient. The mere normal fine dust which would be ever present in the air during a thousand years' prevalence of only the most gentle zephyrs and perfect calms alternant would render impossible a yard of pure coal. The fine

dust that settles on a swamp remains there and accumulates, and it would be very considerable in a thousand years. This is shewn in the peat bogs, which are so recent as to contain helmets and human bones and firkins of butter in their lower depths, where they could not have sunk from the top, but were evidently part of the ruin of the flood which filled those bog basins with forest débris. Firkins of butter don't sink through peat, nor even through water. The peat and tree trunks have filled the bog basins by the same agency that the coal has filled the coal basins, but it has not yet been sealed down with a bed of clay, and buried, and dried, and until that happens it will never become crystallized coal. The peat from the depths below yields the white ash of burnt vegetation, but the surface peat is so impure from the accumulation of dust that it yields an abundant red ash of burnt dust, and is worthless. On the surface of the coal lake the great forest débris would be tossed and agitated by the wind and waves, and washed clean of its attached sand and mud, during several days. During this time the water would be steadily pressing into the tissues and expelling the air, and, all at once, the whole washed and spread-out mass would sink to the bottom on to its own old soil which had sunk before it, and where its own old severed rootage lay re-buried through its earlier descent.

Before writing "Cloud Hill," I experimented with several varieties of green wood floated upon water, and witnessed the gradual water-logging and ultimate sinkage of the whole. Some wood will, of course, become water-logged earlier than other; but in a case of the tangled and crowded vegetation of a forest, the majority would settle the question for the minority, and carry down the dilatory in company, whether ready or not.

Now this is the testimony of the coal basins. And what more they testify will be found in the pages of the Carboniferous Section of the first part of "Cloud Hill." Thus I only deal with and advocate possible, natural, and even logically evident means, in opposition to unnatural conjectures and propositions. The testimony which I have advanced, when all put together, is the testimony of indisputable facts, and does more than merely support a theory. But a deaf ear will still be turned to it by some who strain at a gnat of logic, and swallow readily a whole camel of wild conjectures. As would be expected the coal basins themselves were often disturbed,

as well as the adjacent neighbourhood, and in some instances they also were lifted up and the water drained out of them for awhile, leaving the channels of its outflow furrowed through the last deposited vegetation, and the marl on which it rested.

THE STIGMARIAN ROOT OF THE SIGILLARIA.



BEFORE I come to the full-stop, which time will soon demand, let me say as to Growth-*in-situ* of stigmariæ, that, if only one root without rootlets be found in company with twenty that have rootlets, the one is sufficient to prove that they had not originally grown there. And if a group of any number, all with rootlets, be found in an evenly assorted and stratified soil, the even stratification alone would be sufficient proof that they had not grown there. It would shew that the roots and the soil were sedimentary together and at the same time; for the expansion of crowded root-growth inevitably destroys all traces of sedimentary stratification. This will be clear to anyone who will think for a moment what must be the effect of such rhizomes as those of the stigmariæ penetrating laterally in all directions, and swelling out, and breaking up the lines of original stratification effectually everywhere within their reach. It has been surmised, and said to have been proven, that pressure alone might produce re-lamination in clays. But the potter, from his experience of the behaviour of clays under pressure, knows better. It has also been theorized that the greater the pressure the greater the reduction of the bulk of any clay without known limit. But the fact is that, when the air and moisture are once expelled from clay by pressure, the limit of reduction of bulk by pressure is finally reached. Clay is capable then of only one more slight reduction of bulk, and that is by fiery vitrification. After that all the pressure of the burden of Atlas, and all the fires of Vulcan combined, would result in no further reduction of bulk. The next change, by means of heat without pressure, must be vaporization. And that utmost reduction of bulk of the most aluminous of the coal-marls, from the state of dry mud to that of fiery vitrification, does not exceed a reduction of one-sixth.

Just one more remark in reference to stigmariæ. I have said that it would not be possible for "the comparatively slight stigmarian

root of the sigillaria" to support so great and lofty a stem in a soft purely vegetable bog of 20, 50, or 100 feet in depth, and it has been denied that the root of the sigillaria is slight. All things are only great or small, strong or slight, relatively, by comparison one against another, and with the work they have to accomplish. I am aware that several writers have spoken of the root as strong and large, when urging the Growth-*in-situ* theory, which also means the Growth-in-bog theory. But I speak of it only as I find it; and I find it utterly impossible that such a root could support such a trunk in a foundation of nothing but soft decaying vegetation, which is the only question at this moment before us in regard to the stigmaria. Of course, it was sufficient to support the lofty tapering column in its proper soil of fire-clay. We cannot say what was the utmost height of the sigillaria, as no specimen, so far as I am aware, has ever been found complete, but all have been broken off at, and are deficient of, the top. The incomplete trunks, however, have been found of all lengths below 50 feet, and even as long as 72 feet, and the general circumference at the base is about 15 feet, ranging to 24 feet. Now, compare this great tapering shaft with its stigmarian root, which spreads horizontally and not downwards. Its radiating stems are generally from six to eighteen inches in circumference, with a radius of from four to eight feet, or an entire horizontal radiation over a space from eight to sixteen feet in diameter. The rootlets must not be confounded with the roots, as they were mere tender threads or fibres, shooting from the roots, and penetrating, like the thread of the wheatroot, to very great distances in search of moisture. If any exceptionally large stigmarian roots have been found, they must have supported exceptionally large trunks. And all the evidence we can put together shews that the sigillaria could no more maintain its perpendicularity with such a root in a soft bog, than could the elm of to-day.

I am told that, in speaking of my objection to the long period claimed for the formation of coal seams, it has been asked, "What is this time to Him with whom one day is as a thousand years, and a thousand years as one day?" I regret to have to protest against this misapplication of the sublime passage. My objection was to the theoretic suspension of a natural law, and the allotment by man of thousands of years of exposure to decaying vegetation without

gaseous dissipation ; and a thousand years is not as a day, either to man or to a mass of moist decaying vegetation. It is altogether an out-of-place embellishment to make this appear a restriction of the power of the Eternal in His work of the eternal past. As I have written elsewhere, there was plenty of time in the eternity of the past, for the leisurely accomplishment of all things, and man's greatest effort at cosmical figures, which he deals with so presumptuously, grasps but a minute fragment of that Eternity of the Past.

I have now but one thing more to say. An eloquent reviewer of the first part of "Cloud Hill," after generous compliments paid—generous because he is my geological opponent—says : " We may as well say at once that Mr. Goss has not yet brought home to our own mind his conviction that Lyell, Jukes, Hull, Green, the Geikies, and Ramsay are all wrong, but there are, nevertheless, things in this pamphlet which are worthy the respectful attention of the survivors of even so distinguished a septemvirate." And towards the close of the article the question is asked if it is these distinguished men that I have in view when I condemn the ignorance and presumption of those who build up and dogmatize baseless and inconsistent theories in geological science. I reply to him and to all, that I will yield to none in admiration of the talents of these great men ; and I will yield to none in reverence of their mighty labours in the service of science. The facts which they have built up compose an immortal structure of knowledge. They have thrown bridges across gulfs, and they have laid down firm roads in places which were before but overshadowed quagmires, and places to grope and flounder in. They have also placed stepping-stones beyond these roads, leading to places which they knew not of in various directions backward into the wonderful past—leading to scenes and times respecting which they could only speculate. Who dare assert that the work they so nobly began or advanced is finished ? Work is one thing, mere speculation is another. When these great men utter mere opinions, are we bound to invest their mere opinions with the authority of the evangelists ? They never claimed what their disciples seem to claim for them—that we should subscribe to the doctrine of their infallibility. Of these men and their age it will be said in future generations that "there were giants in the earth in those days."

Let us justly admire the accomplished work of giants—their

edifices of great, piled-up stones—which shall last, like the material Stonehenge, for ages to come. But when they step aside from their true work, and, looking back hundreds of millions of years, venture to dictate from mere opinion the history of the past, and fix the measure of the strides of Time and its work, then are even giants presumptuous! For, in all calculations in which the little brain of man works at millions of hundreds of millions, whether of years or of tons, some little error in the start, some incompleteness of knowledge of the things estimated, leads only to a great false fabric of ignorance and presumption. None feel the truth of this so thoroughly as the astronomer. This, however, does not detract one iota from the monument of honour which the same men have erected for themselves by their Herculean labours in the collection and arrangement of geological facts. In this work the septemvirate is truly an illustrious septemvirate of geological giants.

But I say again, What are even human giants when they pose as arbiters and dictators in the affairs of the creation of this globe? Is a man really increased in mental bulk because he says: Let there be 30,000 years in the past most exuberant Floral Era, during which decaying vegetation shall not have obeyed the laws of nature, and become fugitive in gases? Or when he says: Let the climate of this past most exuberant Floral Era, even the climate of great continents, be cool and equable like the exceptional temperature of a little isle of the sea? Or when he says: Let the basins of the earth's surface of the past be filled from their depths below, to their brims above, with sedimentary matter, even to the depth of 12,000 feet, but let not the basins themselves be created until after they are thus filled? And what is the chorus of their disciples? The chorus of their disciples is this: "And it *was* so!"

INDEX.

Aaron	...	...	...	457, 460	Arnold, Sir Edwin	...	293, 298		
Abbé Vignali	...	...	...	370	Arthur's Camp	...	...	502	
Abbeville	...	...	...	277	Ashton-under-Lyme	...	...	76	
Abergele	...	...	...	348	Asmodeus	...	...	234, 235, 266	
Aberystwith	...	...	...	85, 133	Astbury	...	...	522, 524	
Abraham	...	...	48,	395, 396	Asterophyllite	...	...	59	
Achilles	...	...	...	396, 460	"A Street in a City"	...	...	38	
Ackers' Crossing	...	...	...	520, 521	Athens	...	...	...	228
Adams	...	...	...	117	Audley	...	...	...	520
Adam's Peak in Ceylon	...	...	...	322	Australia	...	...	135, 140	
Adeline	...	...	339,	340, 393, 454	Aven Rosch	...	...	...	382
Agrippa, King	...	...	...	289	Averroes	...	...	...	382
Ajax	...	...	...	247, 248	Axe-edge	...	...	...	502
Aladdin's Genie of the Lamp	...	...	266						
Aldebaran	...	...	...	63	Baal	...	34, 48, 87, 132, 191, 192, 382, 505		
Alderley Edge	...	525,	526,	542, 546	Baaltsis	...	...	...	191
Alexander, or Paris	...	...	202,	203	Baal-zebub	...	...	...	192
Alexandrian Library	...	...	190	Bagnall	...	...	...	66	
Allen, Richard	...	...	...	164	Balkis, Princess	...	477,	481,	482, 483
Alsager	...	...	...	134	Ball, Professor	...	...	...	114
Amazon	...	...	...	554	Bay of Fundy	...	...	...	112
Anacreon	...	...	...	190, 218	Bee and the Box	...	...	483—486	
Anagnos	...	...	...	...	Beeston Castle	...	...	...	502
"Ancient Stone Crosses of England"	507				Bell, John	...	...	...	247
Anderson, Mrs. Wilhelmina Harriet, née Gordon	...	...	3,	195, 495	Bell, Sir Charles	...	244—247,	285	
Andromeda	...	...	...	94	Belt of Orion	...	...	263,	266
Apollo	...	34,	48,	135, 179, 182, 189, 190, 191, 192, 407	Benares	...	...	306,	310, 311
Arachne, Princess	...	182,	184,	185, 189, 211, 212	Ben Nevis	...	...	107,	113
"Arbor Low"	...	350,	382,	505, 506, 545	Berwyn	...	...	...	502
Arcturus	...	...	...	...	Bettws-y-Coed	...	...	...	530
Argus	...	...	...	...	Bevan	...	...	...	79
Argyll	...	...	...	...	Bibbey, Thomas	...	...	...	528
Aristotle	...	...	...	...	Biddulph	...	...	509,	533
					Bimbisara, King	...	...	304,	310
					Blow-fly, The	7—11,	417—423,	424—428	

" Bob " of Surbiton... 394
 Bodhi-tree 309
 Bolivia 246
 Bolland Colonel... 14, 17, 18, 19, 34, 44,
 45, 63, 64
 Bollin River 504
 Bosley 499, 502, 503
 " Botany, A Manual of" 494
 Boucher de Perthes 277
 Bovey Heathfield 516
 Bovey Tracey 515
 Brahm 178
 Brahma ... 150, 178, 302, 314, 319, 320,
 321
 Breidden Hills 502
 Brewster, Sir David 52
 Brighton 394
 Bridestones 499, 501, 504
 Bridgewater, Duke of ... 244, 245, 247,
 275, 276
 Brisbane 148, 173
 Bristol and Somersetshire Coalfield 562
 British Association at Cardiff ... 91, 94,
 102, 104
 Brooks, Bishop 220, 227
 Brough, W. S. 501, 503
 Brown, Robert, F.L.S. 494
 Buckland, Dr. William ... 81, 82
 Buda-Pesth 228
 Buddha ... 150, 168, 177, 178, 293, 302,
 306, 308, *et seq.* 372, 387, 390, 391
 Buenos Ayres 553
 Bunyan, John 373—380
 Burdett-Coutts, Baroness ... 186, 516
 Burns, Robert ... 169, 170, 248
 Buxton 383
 Cader Berwyn 502
 Cader Idris 58, 568
 Calamites 58, 542
 Calamus 58
 California 193
 Canute 505
 Capella 63
 Cardiff ... 91, 94, 102, 104, 148
 Carew 508
 Carinthia, Underground Lakes of... 285
 Carlyle 368
 Carpodapsa Saltitans ... 204, 430, 435,
 445, 446
 Cassell, Petter, and Galpin... ... 56
 Catacombs of Rome 166
 Causeway Green Colliery 534
 Cavan, County 565
 Cerrig-y-Druidion 131
 Ceylon 311, 322
 Challinor, William 499
 Channa 295—301
 Chapman & Hall 56
 Cheadle 66
 Cheddleton 66
 Cheheristan ... 471, 474, 475, 477, 479,
 481, 482, 483
 Cheheristany ... 468, 471, 472, 474, 475,
 476, 477, 478, 480, 481, 482
 Chicago 431, 432, 453, 487
 Chimborazo 363
 Christian & Christiana, the Pilgrims 373
 et seq.
 Churnet Valley 501
 Cicada 190, 218
 Cidaris Sceptrifera 83
 Clonakilty 164
 " Cloud Hill " ... 28, 43, 49, 50, 51, 85,
 116, 253, 346, 350, 351, 448,
 495, 497—575
 Clymene 42
 " Coal Fields of Great Britain " 534—562
 Coddling Moth 435
 Comb's Moss 504
 Comb-leaved fern 59
 Congleton 501, 502, 506, 524
 Congleton Edge ... 66, 67, 509, 520, 521
 524, 533
 Cook 156
 Cooper, Thomas 289
 Cork 162, 163
 Cornwall 511, 516
 Crewe 502
 Croll 568

Cromer Forest Bed ...	532	Fairy Glen ...	530
Crookes, William, F.R.S. ...	19, 89	Falkland Islands ...	553, 554
Cumming, R. Gordon ...	447	Faraday ...	138
Cupid and Psyche ...	102	Farningham, Marianne ...	40
Cutcombe ...	230	Farquhar 232, 240, 256, 272, 273, 408	
Cycads ...	58	Fergusson, James, F.R.S. ...	505
Cyclopteris ...	59	Fergusson, Sir William ...	187
Cyrus ...	190, 316, 342, 460	Flatman ...	357
" Daily Telegraph " ...	340, 433, 464, 465	Flint Jack ...	276, 277
Dancing Beans of Mexico 204, 430—454, 487, 585		Flora ...	179
Dartmoor ...	516	Florence ...	444
Darwin ...	257, 258	Forbes, Archibald ...	363
"Dawn of Creation and of Worship" ...	405	Ford Sprink ...	524
Dawson, Dr. ...	50, 566, 567	Forest of Dean ...	562
Deans, Jeanie ...	402	Forster, Edward ...	164
Dee, River ...	323, 324	Fort William ...	107
Delta in Orion ...	266	France ...	464
De Saussure ...	45	Franks ...	464
Diana ...	191	Fraser, Rev. A. C. ...	503
Dickens, Charles ...	221, 230	" Frost King, The " ...	223—226
Diomede ...	489	Fuller ...	445
Dream, A Terrible ...	4		
Dream, Helen Keller's ...	231		
Dream of Knowledge ...	90		
Dream, Mercy's ...	376		
" Drummond's Natural Law in the Spiritual World " ...	413—416	Gaul ...	464
Dumb-bell nebula ...	94, 233, 239	Gautama 293, 294—297, 301—306, 309	
Earl, E. ...	503	Geikie, Professor Archibald 72, 73, 574	
Eastwood Brick and Marl Works, 53, 75		Gladdish, W. & T. N. ...	79
Echini ...	81	Glaucus ...	489, 494
Edinburgh ...	113	Globigerina ooze ...	77
Ekermann ...	334	Goethe ...	334
Elliot, Sir Thomas ...	506	Gordon, General ...	13, 385, 402
Enid and Elaine ...	402	Gordon, Miss ...	48, 340,
Eozoon Canadense ...	29, 240	Goss, Mark Wentworth ...	193, 204, 430,
Epsilon in Orion ...	266, 267, 270, 272, 344	444, 452, 499, 501, 503, 575	
Euphorbia ...	435, 438, 444, 446	Goss, William Henry ...	155, 364, 495,
Fair Maid of Llangollen ...	323	499, 501, 503, 574	
		Gothic Magi ...	459—464, 467
		Goyt Hall ...	525
		Gravesend ...	79, 84
		Green, Professor A. H. ...	520, 522, 526,
		574	
		Greenhithe ...	79
		Greenwell, Rev. Canon ...	529
		Grotto Wood ...	520, 521, 522, 524
		Guyot, Arnold ...	109

Haley 261
 Halley 117
 Hallowell, Rev. Alexander Ben ... 164
 Hamlet 219, 226
 Hampton, E. & Sons 55
 Hampton, William, F.C.S. ... 75
 Hanley 53
 Harthill-moor 529, 530
 Hassall 508
 "Hebrew Captives" ... 19, 43, 45, 233,
 272, 273
 Hector 203, 397
 "Hell—Where is it?" ... 148, 154, 326,
 329
 Helen 202
 Herakles 157, 158, 159, 171
 Her Majesty The Queen Empress ... 194
 Herbert, R. A. 247
 Hercules 140, 365
 Herod 13
 Herschel, Dr. 124, 350
 Himalayas 560, 568
 "History of King Ruzvanshad and
 of the Princess Cheheristany" 468—483
 "History of Leek" 500
 Holland 138
 Homer ... 202, 338, 397, 459, 489, 494
 Huggins, Dr. ... 91, 94, 96, 104, 148
 Hull, Professor E. ... 520, 526, 535, 536,
 537, 538, 540, 544, 545, 562,
 563, 574
 Hulme Walfield 504
 Humboldt, Baron Von 363
 Huxley, Professor 566, 567
 Iceland 138, 532
 "Iliad" 202, 396, 397, 489
 Illinois 193, 444, 445
 "In Memoriam" 352, 355
 India 462
 Ipstones Fields 66
 Isle of Man 277
 Isle of Purbeck 515
 Italy 138
 Jamaica 183
 Jameson, Mrs. 334, 343
 Jardine, Sir William 440
 Java 58, 138
 Jermyn St. School of Mines ... 79
 Jewitt ... 13, 53, 56, 90, 129, 272, 277,
 278, 281, 505, 529, 530
 Joanna Southcott 77
 Jordan 504
 Josephus 393
 Jukes, Professor 534, 535, 536, 543, 561,
 562, 567, 574
 Jumping Beans ... 204, 430—454, 487,
 585
 Juno 396, 397
 Jupiter ... 13, 42, 140, 152, 182, 247, 263,
 396, 397
 Jupiter Tonans 13, 152
 Kantaka 297, 301
 Kapilavastu 294, 297
 Karma ... 308, 309, 318, 319, 325, 348,
 373, 375, 381
 Keller, Helen ... 220—232, 467
 Kells 508
 Kentucky, Mammoth Cave of ... 285
 Khartoum 402
 Kilnaleck, co. Cavan 565, 566
 King, Miss Alice ... 229, 230, 232
 King Solomon 189
 Kingsteignton 516
 "King's Vale Royal of England" ... 506
 Kisagotami 311
 Knight & Bevan 79
 Koh-i-noor 52
 Krakatoa crater 129, 139, 141
 Kropotkin, Prince ... 349, 350, 351, 352
 Laing ... 3, 4, 29, 44, 48, 49, 77, 97, 99,
 117, 118, 120, 124, 154, 169,
 174, 175, 240, 241, 242, 245,
 248, 257, 258, 265, 279, 283,
 285, 286, 287, 288, 289, 352,
 355, 360, 362, 363, 364, 367,
 368, 372, 378, 380, 381, 385,
 386, 391, 395, 398, 399, 401,
 402, 405, 406, 407, 409, 410,
 414, 415

Laplace 91, 94, 117
 Laud, Archbishop 162
 Lausanne 230
 Lawrence 402
 Lawton Heath 527
 Leaf-rollers 435—447
 Leaves 489—492, 494
 Leech, Arthur 503
 Leek 499, 524
 Lee Moor 137
 Lepidodendra 58, 542
 Lepidoptera 435
 Lichfield 500
 Life germs 5, 6, 11
 "Light of Asia" 298—301
 Lilly 506
 "Lioness" 231
 Little Ouse 279
 Livingstone, Dr. 186, 200
 Llangollen 206, 323, 502
 Logan, Sir William 537
 Loire 279
 London 235, 246, 290, 412
 Longton 66
 Ludlow 502
 Luminous paint 23
 Lyell, Sir Charles ... 112, 516, 538, 544,
 545, 561, 562, 564, 566, 567, 574
 Lynam, Charles ... 499, 501, 503
 Macclesfield ... 346, 501, 502, 504, 522,
 524, 526, 531
 "Macclesfield, Rambles Round" ... 501,
 504
 Maclarens 538
 Magi ... 316, 457, 458, 459—464, 467
 Mahomet 266
 Mammoth 351, 546, 552
 Manchester 502
 Mantalini 217
 Man the Inheritor 548
 Marn 309, 317, 318
 Maranoa 129
 Market Drayton 520
 Marks 261
 Mars 203, 208
 Martin, William 162, 163
 Mason Spider 183, 184
 Mathew, Theobald 162, 163
 Matterstall 520
 Matthews, Charles 323
 Maya 294
 Medusa 204
 Melchers, Runge & Co. 433
 Melland, Rev. 500
 "Memoirs of the Geological Survey
 of Great Britain" 520
 Menelaus 202, 203
 Menoutcher 471, 474
 Methuselah 115
 Mexico ... 193, 204, 412, 430, 431, 435,
 446, 554
 Milky Way 93, 101, 266
 Minerva ... 182, 189, 203, 204, 208, 211
 Mississippi 50
 Moel 508
 Moel Faman 502
 Moel-y-Cloddian 502
 Molyneux, W., F.G.S., etc. ... 520
 Mont Blanc 560
 "Morning" ode 13, 90
 Moscow 235
 Moses 12, 457, 460
 Mount Ararat 234, 235
 Mount Ossa 140
 Mount Pelion 140
 Mount Pisgah 504, 505
 Mount St. Augustine 129
 Mow Cop 502, 508, 509, 520, 521, 533
 Muezin ... 469, 470, 472, 473, 478, 482
 Nantes 505
 Nantwich 502
 Napoleon the Great 370
 "Natural Law in the Spiritual
 World"—Drummond's 413—416
 "Natural Sentences and Punishments—
 Automatous" 326 *et seq.*
 Nebular Theory 3, 24
 Nene, River 340

Nepaul	294
Neptune	...	...	...	63, 94, 523
Nerve-leaved fern	...	...	...	59
Neuropterus	...	...	...	59
New Caledonia	...	...	...	150
Newcastle-under-Lyme	...	57, 288			
"New Ireland"	...	...	...	162
Newton	20, 89, 96		
"Nine Ladies"	...	...	...	530
"Nineteenth Century"	...	...	...	405
Nirvana	...	293, 294, 307, 308, 309, 310, 313, 317, 318, 319, 320, 321, 375, 380, 390			
"North British Review"	...	...	...	52
North Pole	..	...	...	545
North Rode	...	...	...	503, 524
"North Staffordshire Naturalists' Field Club and Archaeological Society"	...	497, 499, 549			
Norwood, Rev.	...	...	...	500
O'Brien, Richard	...	...	...	164
Odin	...	...	...	385
Odontopteris	...	...	...	59
Oise	...	...	...	279
"On the Constituents of English China, Earthenware, and other Ceramic Bodies"	...	...	...	78
"On the Discovery of the Petrified Ruins of an Ancient Forest"	51, 64, 495				
"On the Hand"	...	245 <i>et seq.</i> 285			
Orion	...	263, 266, 267, 270, 272, 344, 350			
Osiris	189
Paddy	...	339, 388, 389, 390, 393, 454, 455, 456, 457			
Paris, or Alexander	202, 203		
Parkfield Colliery	...	...	...	544
Pathan prisoner	...	...	...	463
Peckforton	...	...	...	502
Pecopteris	...	...	...	59
Pendennis	...	...	...	402
Pengelly	...	...	...	516
Penmaenmawr	...	130, 131, 133			
Pensarn	...	...	...	348
Peoria	204, 430, 431, 444, 445		
"Perfect Through Suffering"	336, 340				
Perkin's Institute for the Blind	222, 223				
Persian Tale	...	...	...	467—483
Peru	412
Peterborough	...	...	...	340
Phaeton	...	...	...	42
Pharaoh	189, 457, 458, 460		
Pharos	...	...	...	409
Philip of Macedon	...	...	...	190
Phoebus Apollo	...	34, 42, 182, 185, 190			
Pike, Messrs.	...	...	...	206
"Pilgrim's Progress"	373 <i>et seq.</i>		
Pim, Jonathan	...	...	...	164
Pleiades	...	...	...	350
Plymouth	...	...	...	207
Pompeii	...	...	...	55, 56
Poole in Dorset	...	...	...	206
Pope, Alexander	...	...	...	357
Poynton	...	...	...	525
Prestwich, Professor	...	...	...	279
"Primitive Man and his Work"	...	416, 417, 495			
Proctor, Richard A.	25, 104		
"Proem to Genesis"	409, 410		
Psyche	...	...	...	233, 239
Puerto Cabello	...	...	...	282
Punctured-stem	...	...	...	60
Purbeck	511, 515, 516		
Purna	...	...	...	312, 313
Pyrenees	...	...	...	461
Queen Empress, Her Majesty The	194				
"Rambles Round Macclesfield"	501, 504				
Ramsay, Professor	...	...	...	574
Raphael	234, 266, 272, 273		
Ray-mill	...	...	...	19, 89
Rector of Stoke-on-Trent	...	...	...	412
Red Rock Fault	...	...	...	520—525
Redgrave, R.A.	...	...	...	247
"Reliquary" The	...	...	...	350, 505
Renan	...	...	...	368
Rhyl	...	...	...	135, 344
Rimmer, Alfred	...	...	...	507

Roaches 502
 Roberts, Lucy 402
 "Robin Hood's Stride" 530
 Rochester 500
 Rode Heath 7, 8, 421
 Rode, North... 503
 Rosher, H. & E. 79, 84
 Rosherville Gardens 84
 Round-leaved fern 59
 Royal Society 141
 "Rude Stone Monuments" ... 505
 Rudyard 502
 Runcorn 502
 Rushton 499, 500, 503
 Rushton Church 499, 503
 Kuzvanschad... 468—483
 Sahara 253, 556
 Sainter, J. D., F.G.S. ... 501, 504, 505,
 506, 508, 520, 521
 Saladin ... 148, 154, 155, 156, 157, 158,
 159, 169, 170, 171, 173, 194,
 195, 326, 329
 Sandbach ... 502, 506, 507, 508
 Sarytschew, Gabriel ... 351, 546
 Saturn 63, 112, 263, 396
 Scale-trees 58
 Schumachoff, Ossip... ... 351, 546
 "Science for all" 56
 Seal-stems... 54, 58, 60, 70, 71, 72, 73,
 Sea Urchins 81
 Sedan... 363
 Seine 279
 Shafferlong 66
 Sheffield 525
 Shiva 178, 314
 Shutlingslow 502
 Sicily... 138
 Siddartha Gautama ... 293, 294—297,
 301—306, 309
 Sidney 401
 Sigillariae ... 54, 69, 72, 73, 75, 76, 542,
 543, 572
 Simla 462
 Sirius... 63, 86, 87, 272
 "Sketches in Canada, etc." ... 334
 Sleigh, John... 500
 Smith, Alfred 200
 Smith, Rev. Richard 499, 503
 Snowdon 58, 568
 Solomon 189, 190
 Somme 279
 Southcott Joanna 77
 Southport ... 11, 135, 179, 180, 209, 217,
 485
 Spain 138
 Sphenopteris 59
 Spiders 180
 Sphinx 456
 Sporangia 566
 Sronaparanta 312, 313
 "Staffordshire Advertiser" ... 499
 "Staffordshire Sentinel" Letters
 to The 128—141
 "Staffordshire Sentinel," Reprint
 from 549
 St. Austells 137
 St. Helena 370
 Stigmaria ... 60, 69, 73, 76, 543, 572
 Stockport 502, 520, 522, 524,
 Stoke 8, 288, 421, 430, 503
 Stonehenge 506, 575
 "Story of a Boulder" 72
 "Story of a Genie" 265—272
 "Story of a Spider and a Fly" ... 209—
 218, 274
 St. Paul's Cathedral 284
 "Street in a City," A 38—40
 Sullivan, Alexander M. ... 162, 165
 Sullivan, Miss 226—232
 Sunda, Straits of 129
 "Sun-glow" ... 122, 124, 125, 127, 128
 Surbiton 394
 Symons, G. J., F.R.S. 141
 Tarantula 185, 193
 Taylor, Mrs. J. D. 394
 Teign... 516
 Teigngrace 516

Tennyson	... 352, 355, 356, 358, 382, 403	Vale of Clwyd	... ... ...	... 501
Testudo Gigantea	... 253, 448, 556	Vale Royal of England	... ... ...	... 504
Tetrix or Cicada	... ... 190, 218	Valley of the Amazon	... ... ...	... 58
Texas	... ... 220, 222, 467	Vega	... ... ...	63, 86
Thames	... ... ... 79, 84, 279	Venus	... ... ...	21, 203
"The Cosmos and the Logos"	30, 31, 33	Vishnu	... ... ...	178, 314
"The Earth and Man"	... ... 109	Vulcan	... ... ...	152, 217, 460
"The Frost King"	... 223, 224, 225	Vulpecula	... ... ...	94, 233
"The Purgatory of Suicides"	... 289	Ward, John, F.G.S., etc.	... ...	520
The Quaker and the Friar	... 161—165	Wardle, Thos., F.G.S., etc.	... ...	520
Thetis	... ... ... 396, 460	Warrington	... ... ...	502
"Things not generally Known"	52, 53	Webb, Richard	... ... ...	164
Timbs, John	... ... ... 52	Wedge-leaved fern	... ...	59
Titterstone Clee	... ... ... 502	Wells, Jas. H., of Chicago	... 432, 433,	
Tom Tiddler's Ground	... ... 283	435, 436, 453, 487		
Toothill	... ... ... 504	Wely	... ... ...	478, 480
Tooth-leaved fern	... ... ... 59	West Kirby	... ... ...	508
Topsy	... ... 191, 243, 261	Westwood, Professor J. O.	... 446, 447	
Torquay	... ... ... 207	Wetley	... ... ...	66
Trap-door spider's house	... ... 193	White, Rev. J.	... ... ...	362
Trichinosis	... ... ... 11 <i>et seq.</i>	Whymper	... ... ...	363
"Tristram Shandy"	... ... 14	Woolborough	... ... ...	516
Tubal-cain	... ... ... 217	Wragge, Clement L.	... 107, 113, 128,	
Tubiculous Annelids	... ... 347, 532	129, 135, 140, 148, 173		
Tunstall	... ... ... 508	Wrekin	... ... ...	502
Tyndall, Dr.	... ... ... 122	Xenophon	... ... ...	316, 342
Ulysses	... ... ... 338, 403	Yasodhara, Princess	... 295, 297, 298	
"Uncle Philip's Conversations with Children"	... ... 183, 439	Yorke, General	... ...	324
"Uncle Tom's Cabin"	... ... 261	Yucatan	... ... ...	554
"Underground Life"	... ... 56	Zeta in Orion	... ... ...	266
Uranus	... ... ... 63	Zulus	... ... ...	207
Valencia	... ... ... 282	Zutphen	... ... ...	401

FINAL NOTE.

25 JUNE, 1895.

While the printer is actually waiting, the Index being completed, I take the opportunity at the last hour to add a final supplemental Note—final so far as this book is concerned—respecting the Dancing Beans. I have continued to observe them attentively every day and every night since last reporting upon them on the 13th of May. But up to the 19th inst. there was no change to note, except that the movements became somewhat slower on the whole; especially those of M., who used to take the lead; yet M., although latterly decidedly more languid than W., has been generally the first to move under the influence of the light, whether of the midday sun or the midnight lamp; while W. has been decidedly the more vigorous of the two when once aroused. But in the night of the 19th inst. I watched in vain for any movement whatever on the part of M., and the same complete inactivity has prevailed during each period of observation since; namely, during twelve watchings, including one at noon to-day, and each of longer duration and closer attention than any which preceded the 19th. Its companion, however, still moves daily and nightly, under the usual influence of sun and lamp, and moved at noon to-day.

This prolongation of active existence, even in the case of the now inactive M., beats all previous record that has come under our notice. For since the mysterious larval prisoner in the bean—if larva it was—had actually eaten its house completely empty, leaving not a trace of food, and began to carry that empty windowless house about with it—some time in July last—eleven months have elapsed. And what an eternity that may have seemed with the perpetual solitude, perpetual darkness, perpetual deprivation of all food and drink—even bread-and-water prison fare—and the perpetual exclusion of all scenes and objects, and with no other exercise than the monotonous carrying-about of that dismal dark cell! And we know that it was previously an eater, for it had certainly consumed its bean-kernel, and thereby

acquired its maturity as a Dancer, and its strength to lift and push its then foodless cell about. And this prolonged mysterious existence is the more wonderful, as I observed when it was less prolonged, in that I am recording such a survival through and after an extra Arctic winter ; while we know that the natural habitat of these creatures is semi-tropical. And yet we cannot tell whether all these seeming evils and seeming privations of the solitary cell-life constitute a stage unhappy and punitive, or a stage of prolonged serene bliss leading on to another happier still.

Now by whatever means this prolongation of vitality and activity has been maintained, it must have been by regular, natural, healthy means ; and certainly not by any unnatural or irregular accident. It could only have been by ordinary Divine Creative Contrivance, seeing that it is successfully carried on in ever-successive generations of these carpopapsa creatures. And yet it is by some mysterious means which evidently in no manner resemble those by which the regular, natural, healthy vitality of anything of the nature of a leaf-roller is maintained ; for the two conditions of birth, life, and habitat so essentially differ that they belong to essentially different natures. And we know that any radical irregularity in insect life, as to food or no food or unsuitable food and habitat, is rapidly followed by failure and death. The mysterious circumstances of the birth and living of the Dancer, which appear to us abnormal, are evidently not abnormal to this creature, whatever it may prove to be, but happen regularly season after season, as a regular part of God's Creative and Preservative Power and Wisdom ; although we are utterly ignorant of both the causes and the ordained consequences.

It is curious to reflect that this late Dancer, having ceased to move, must have entered upon another totally different stage of life within that still cell ; if it be not dead. If it be the mere sleep of pupa transformation, and the ordinary natural result should follow, we must look for the imago resurrection at some time. This I shall now watch for, placing the bean in its box on a surface of loose soil under a lid of glass. Thus far there is no external change whatever in these bean-cases, and no sign of an attempt at perforation ; from which we may judge that if there is to be any issuing forth at all, it will be after the perfection of a final imago state. If the pupa stage be now indeed entered upon, it must have been preceded by three

other stages instead of the two that are common to winged insects. There would be first the egg, solitarily deposited in the pistil of the Euphorbia blossom ; and that egg must have remained an unusually long time unhatched, while it was finding its way into the incipient seed, and then waiting there until the seed, or berry, had fully matured for the hatched thing to feed upon. For the kernel must have formed around the egg before the egg was hatched and began to feed upon that kernel, which must have grown to the fulness of its own shell or case, giving that case its existence and its full and healthy form without the slightest scar of puncture, or the malformation which must have resulted from its being in course of consumption by the feeder before the completion of its fulness and ripeness.

Then, when that egg was hatched, and the thing started feeding and kept at it until it had eaten everything contained in the house, its larva stage—if larva at all—would, in the usual course, have been completed, and its larval maturity fully attained, and its pupa stage immediately entered upon—a state of inactive sleep during a course of metamorphosis or re-creation. Instead of which that early, feeding, active, supposed larval stage, is succeeded by a long period of increased and wonderful activity—but still a foodless and lightless stage—the only stage we have any positive knowledge of, or have been able to observe at present—certainly not the pupa stage, or period of quiet metamorphosis—and there the mystery rests for the present.

Should it prove that the true pupa stage is that which M. entered upon on the 19th inst., to be followed by an imago—which shall burst forth from its inner pupa-tomb furnished with a ready-made implement to bore a passage out of the carpopcsa cell—there will still remain the wonderful eleven months of activity in the solitude of dark imprisonment without any prison fare ; a mystery which we cannot unveil ; but which is evidently the ordained and accomplished Act of God's Creative and Preservative Power and Wisdom ; whether a punitive blessing, or a blessing of passing joy.

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